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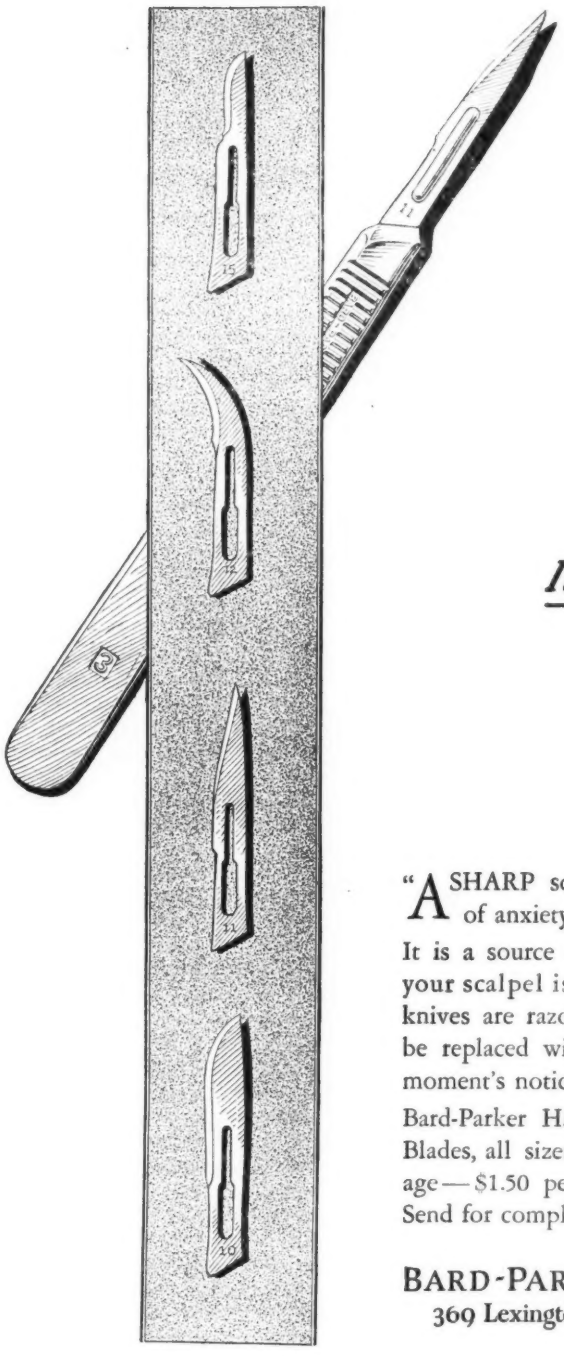

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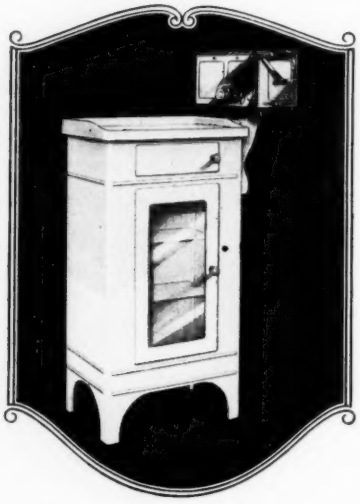

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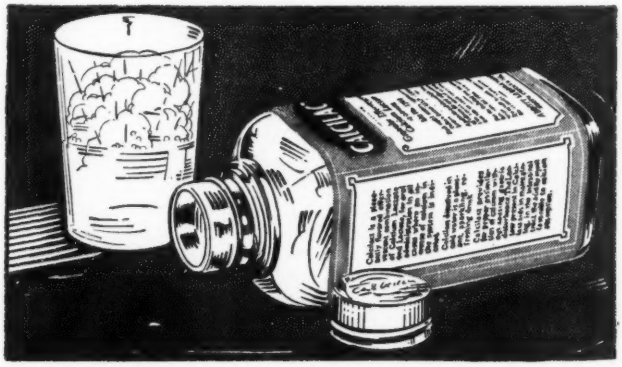

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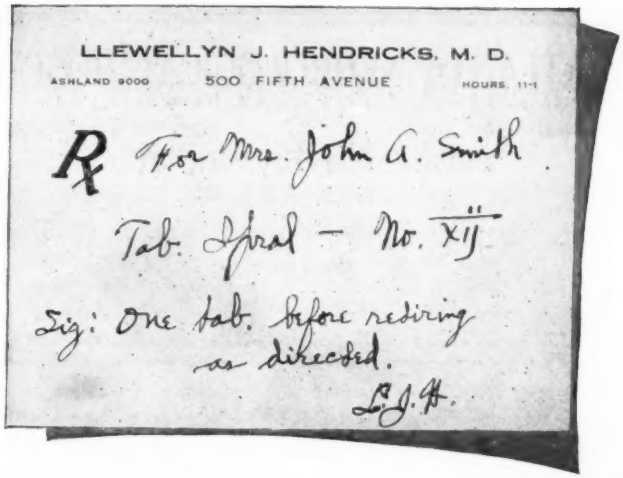

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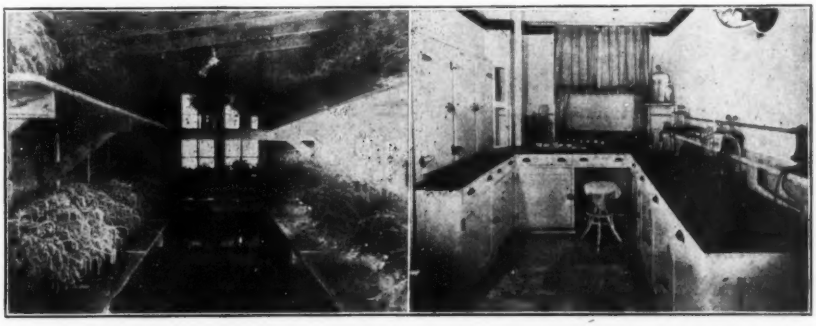

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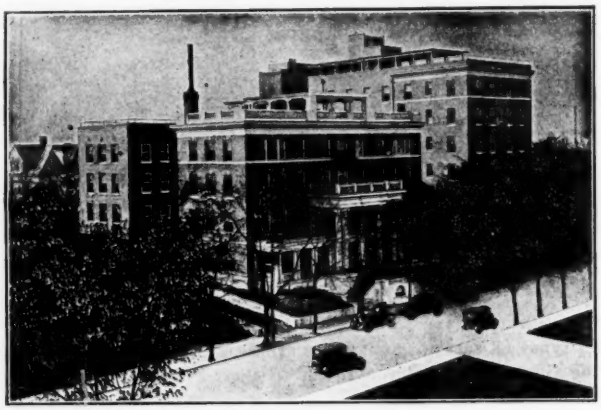

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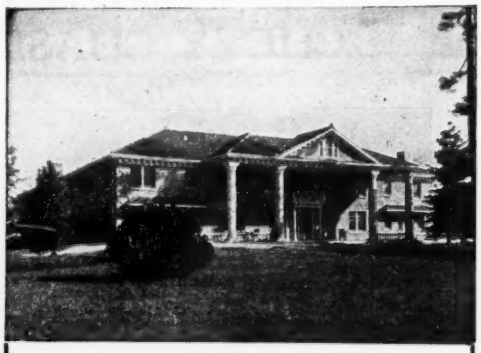

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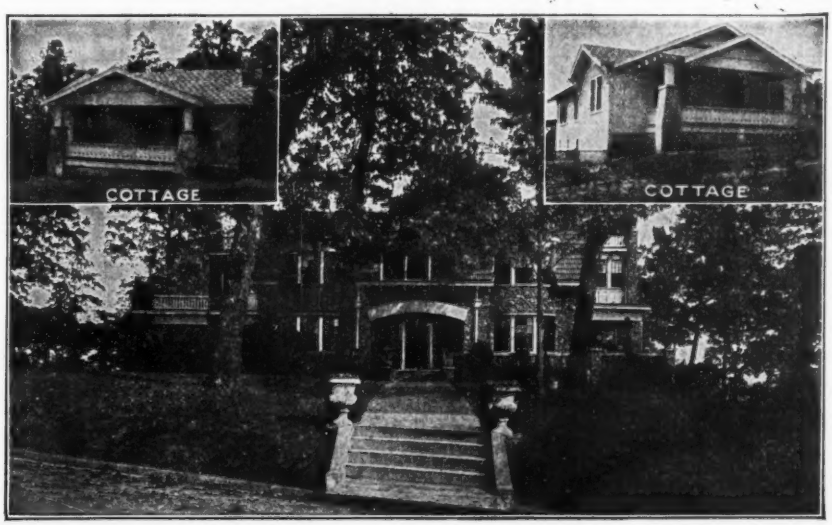

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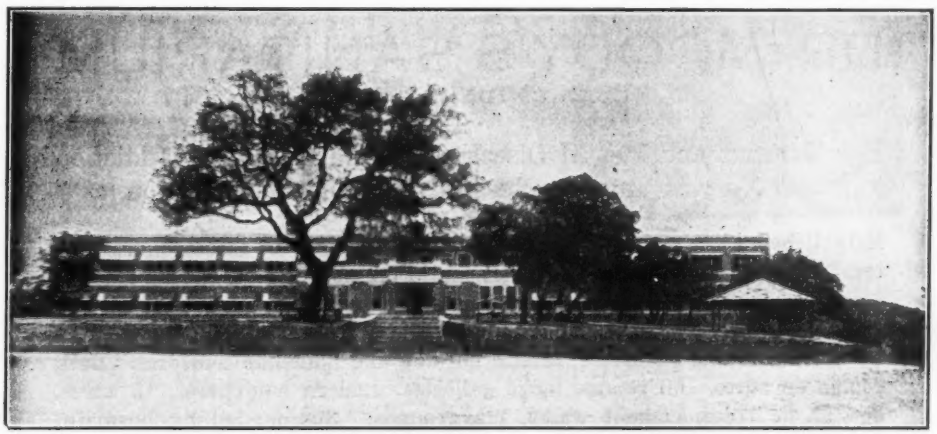

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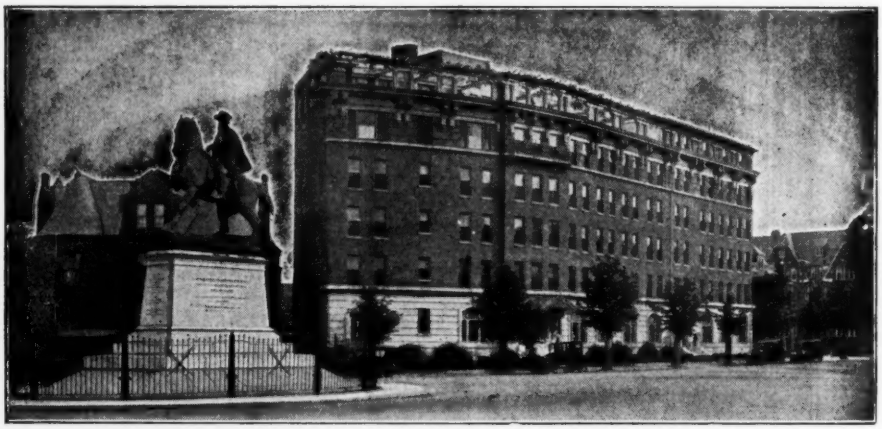

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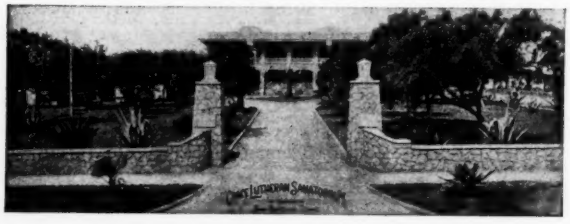

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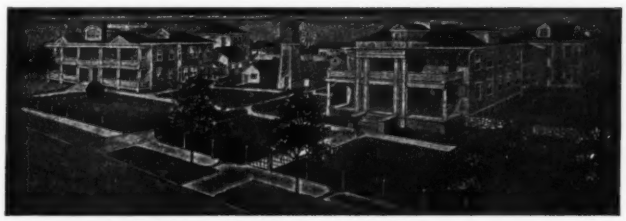

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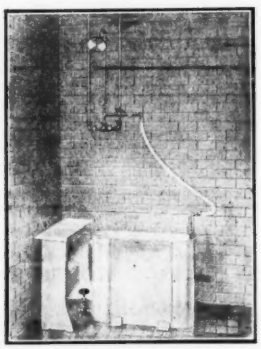

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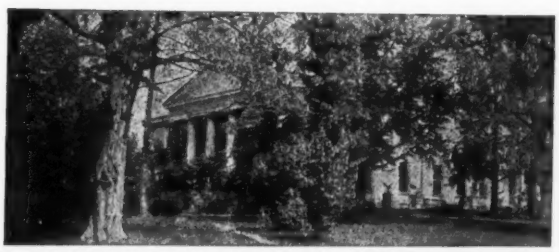

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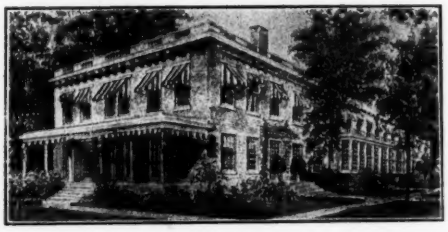

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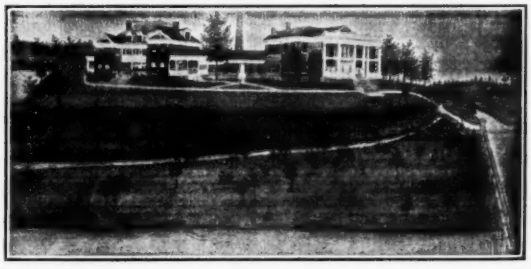

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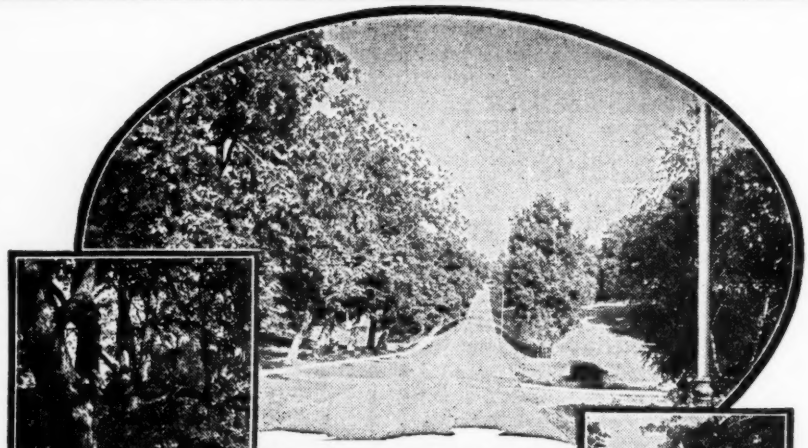

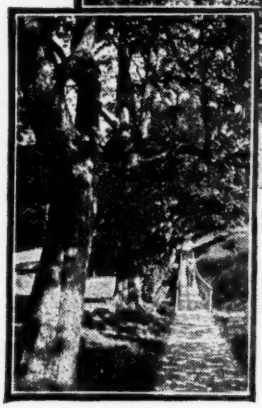

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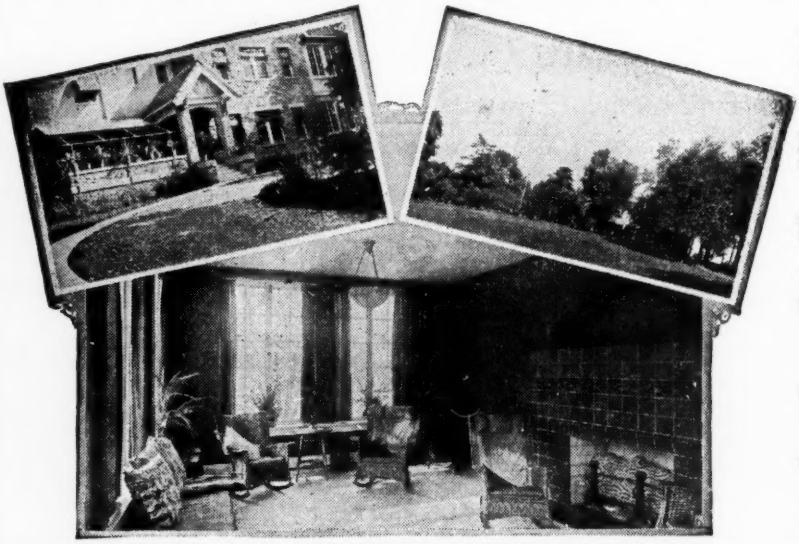

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FAT EMBOLISM

III Pathology of Lungs in Experimental Fat Embolism*†‡

By EDWIN P. LEHMAN, M.D.,
University, Va.

and

ROBERT F. MCNATTIN, M.D.,
Chicago, Ill.

Fat embolism, traditionally a surgeon's problem, is not necessarily traumatic in origin. This has been proved by the finding of fat embolism after death from many non-traumatic causes, as recorded in the literature and as confirmed by us in a recent study of fifty unselected human lungs.[1] Further proof has been offered in an earlier report in which we record the experimental production in dogs of fat embolism without trauma.[2] This was accomplished by the prolonged administration of ether during the lipemic phase of digestion of a fatty meal. The suggested mechanism is that the ether vapor in the blood stream takes into solution the finely divided fat particles of the physiological plasma emulsion and deposits the fat in larger globules as the ether vapor tension diminishes at the alveolar surfaces. Experiments reported at the same time with artificial emulsions in the test tube suggest that the products of protein decomposition may also effect the same result although necessarily by a different mechanism. A water extract of necrotic muscle, solutions of peptone and of histamine, each will free the fat from an artificial soap-held emulsion. No direct production of fat embolism by these substances has been demonstrated.

Experiments on the tolerance of dogs for intravenous doses of cottonseed oil at that time placed the sublethal level at about 1.5 c. c. per kilogram of body weight. The present study will modify that value slightly. The fat in a single human femur is about 0.86 c. c. per kg. of the individual's weight. Unless there is some as yet undefined influence, such as the physical and chemical differences between cottonseed oil and the natural oil of the human marrow, it is difficult to reconcile death ascribed to fat embolism of an individual who suffers from a single fractured femur, with the fairly well established tolerance of dogs for intravenous fat injection.

One must consider, further, the high incidence of fat embolism, post-mortem, in bodies dead from all sorts of diseases. In our series of 50 lungs, well over half showed definite free fat in the capillaries. In some of these, the amount of fat was small, but as we have seen innumerable times, the examination of a small portion of a lung gives no idea of the amount of fat present. In the intravenous fat injection experiments reported here, it was very common to find in a lung loaded with fat numerous fields where no fat could be found.

If something other than mechanical disturbance of the fat depots can free fat in the blood stream, then the finding of fat post-mortem does not necessarily mean that the fat was freed by the trauma. Those physical and chemical changes in the blood stream that accompany shock early and tissue damage later, may have freed the fat from the plasma emulsion. In certain cases of multiple bone fracture prompt death may be ascribed to fat embolism. But the proof of death from fat embolism in later types from less degrees of trauma has not yet been satisfactorily established. In these types, symptoms and death may occur from the disordered physiological processes that at the same time are causing the fat embolism.

Clinicians and pathologists are largely in agreement that small amounts of free fat in the blood stream are without clinical significance.

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*Read in Section on Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the Department of Surgery of Washington University, St. Louis, Mo., and the Department of Surgery and Gynecology of the University of Virginia.

‡Some of the experiments reported were performed by Robert M. Moore, M. D., Boston, Mass., and Colby Hall, M. D., St. Louis, Mo.

Fig. 1
Lung (L. P.). Dog No. 30, killed seven days after intravenous injection of 0.8 c. c. cottonseed oil per kg. Edema and congestion.

The definition of the amounts that are of significance is wholly lacking. There are few data on the nature of tissue change from fat embolism, inasmuch as most human material studied is either from the type of case in which death occurs too soon for much change to take place or from the type in which other factors make equivocal the significance of changes observed. In the rest of the human material, in which little or no fat is found, the possibility is not considered that traces of former acute change found might be the result of earlier occurrence of fat embolism. The entire field is in a state of confusion. This study was undertaken in an attempt to clarify certain phases, namely: (1) to determine the changes in the lungs of dogs that have suffered from known fat embolism, uncomplicated by other factors, and have survived; (2) to determine these changes in dogs that have not survived; (3) to check the tolerance of dogs for cottonseed oil.

There is one other specific point, suggested by us in our earlier work, on which we hoped to shed some light. If ether circulating in the blood of fat-fed animals will cause fat embolism, it is then quite possible that all ether anesthesia is accompanied by degrees of fat embolism, depending possibly on the length of the anesthesia and the richness of the plasma emulsion during its course. It is further possible that this fat embolism may cause changes in the lung which are expressed clinically as pulmonary complications, so-called "ether pneumonia," and which are usually ascribed to thrombotic embolism.

After this study was far advanced the interesting work of Pinkerton[3] appeared, demonstrating certain differences in pathological changes in the lungs of rabbits following the intratracheal insufflation of various oils. He found:

> (1) that vegetable oils (olive oil, iodized sesame oil and iodized poppy-seed oil) cause no change in the lungs; (2) that animal oils (milk fat, rabbit fat, cod-liver oil, lard oil) cause marked fibrosis and giant-cell formation in a few days; (3) that mineral oil is quickly emulsified and taken up by phagocytes in the alveoli and thereby produces consolidation of the lung with late slight fibrosis and giant-cell formation. If such marked differences occur when fat reaches the alveoli from the trachea, it seemed desirable to check their occurrence when the fat reaches the lung through the blood vessels.

A short supplementary series was therefore studied with the injection of other oils.

Fig. 2
Lung (L. P.). Dog No. 34, died eighteen days after intravenous injection of 1.66 c. c. cottonseed oil per kg. Pneumonia and slight bronchitis. Endothelial cell proliferation. Localized collections of polymorphonuclear leucocytes.

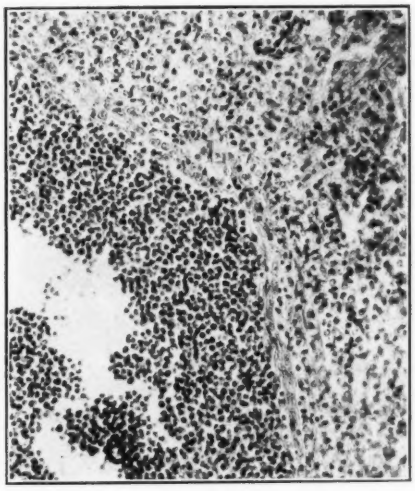

Fig. 3
Same as Fig. 2 (L. P.). Pneumonia and marked purulent bronchitis. Endothelial cell proliferation.

We have found little previous work that throws light on the phases of this subject that this study has attacked. The general literature on fat embolism is reviewed in our earlier papers.[1,2] There have been a number of quantitative studies on the tolerance of animals for injected fats in the form of emulsions or pure oils. Scriba[4] found that the dog and the rabbit show no threatening symptoms until one-third of the entire body fat mass is injected at one sitting. Fuchsig[5] reported the fatal intravenous dose of olive oil in dogs to be 2 gm. per kg. Wegelin,[6] reporting the work of Kojo, presented varying figures for the lethal dose in the rabbit of olive oil, rabbit fat and human fat. He referred these differences to differences in viscosity, that is, to the different amounts of fat that reached the greater circulation. His figures range around 1 gm. per kg. Paul and Windholz[7] attempted to find a physiological cause for symptoms following fat embolism. They found that repeated injection of human fat into the veins of the rabbit in sublethal doses result in non-protein nitrogen retention and hypoglycemia. This elaborate study also recorded the pathological changes in the lungs in their animals. They observed endothelial proliferation and an increase in leucocytes. The fat is taken up by endothelial cells and histiocytes with the formation of giant cells. Lepehne,[8] investigating the possibility of applying medicaments to the lung by intravenous injection of oils, found that in rabbits a solution of 5 per cent menthol and 10 per cent eucalyptus oil in olive oil could be injected in doses of 2 c. c. per kg. without marked reaction, even when given daily for as many as ten injections. Larger doses gave symptoms, largely of central nervous system origin, but not necessarily death. The pathological findings in the lungs were hemorrhages, usually minute, and occasional endothelial proliferation that made the alveoli scarcely recognizable. He observed no acute inflammatory changes.

Fig. 4
Same as Fig. 3 (H. P.). Bronchial exudate.

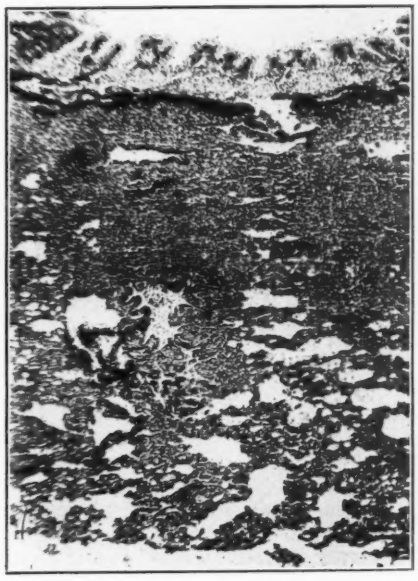

Fig. 5
Lung (L. P.). Dog No. 301, killed thirty-five days after intravenous injection of 1.2 c. c. cottonseed oil per kg. Obliteration of alveolar architecture by endothelial cells and fibrosis.

Experimental.—In all of our experiments, the

Fig. 6
Same as Fig. 5 (H. P.).

oils were injected into the jugular vein of dogs under light ether anesthesia and with aseptic technic. In none was there evidence of infection in the wound. A few of the dogs were killed early for study. Most of them were allowed to survive until they either died spontaneously or seemed to have completely recovered from the injection. A total of 33 animals was employed, of which nine represent relatively short experiments with other oils than cottonseed oil.

RESULTS

The results of this study will be reported in two main groups: (1) the cottonseed oil experiments; (2) experiments with other oils.

Among the twenty-four dogs (*Table 1*) that received cottonseed oil, there are represented dosages varying from 3.0 c. c. to 0.34 c. c. per kg.; and durations of from one hour to 572 days. Most of the dogs received either 1.5 c. c. or 1.2 c. c. per kg. A study of *Table 1* suggests that the lethal dose lies somewhere between these two figures. It is seen that two of five dogs that received 1.5 c. c. per kg. lived over three months, whereas three of eleven dogs that received 1.2 c. c. per kg. died before the twenty-third day. It is therefore probable that individual tolerance varies widely; it may possibly be dependent on the presence of virulent organisms in the air passages.

Gross examination of the lungs of dogs that died or were killed shortly after intravenous injection showed usually edema and miliary hemorrhages, varying somewhat in degree with the amount of oil injected. Later the lungs show fewer hemorrhages and less edema. There are usually patches of consolidation and of emphysema. A few show definite bronchopneumonia. One (Dog 334) showed also a purulent pleurisy. No gross abscesses were found. The dogs killed after three weeks usually present areas of consolidation, but edema and hemorrhage are infrequent.

Microscopic study of the lungs in this series enables one to reconstruct with probably some degree of accuracy the progress of the tissue reaction to cottonseed oil emboli. The primary effects are mechanical. There is blocking of the capillaries, passive congestion, edema. Red cells escape from the dilated capillaries. Whether this is by diapedesis or rupture is not certain, but the diffuse scattering of red cells through the edematous septa suggests that the former is often the cause. Definite miliary hemorrhages occur. As the process continues,

Fig. 7
Lung (L. P.). Dog No. 311, killed five months after intravenous injection of 1.5. c. c. cottonseed oil per kg. Thickening of alveolar septa and encroachment on alveoli.

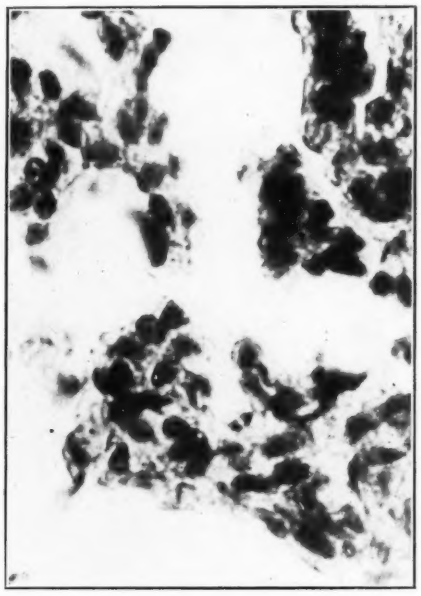

Fig. 8
Same as Fig. 7 (H. P.). Area of endothelial cell increase.

polymorphonuclear and mononuclear leucocyte infiltration is seen, probably within a few hours of the onset. Within a few days new elements appear in the form of endothelial leucocytes and fibroblasts. The latter are very few at first, while the former predominate and rapidly increase. At this stage one finds the alveolar spaces much narrowed and the septa enormously increased in thickness. Examination of the septal structure shows a mass of endothelial cells with a few polymorphonuclear and mononuclear cells and an occasional fibroblast. There is practically no edema and no hemorrhage. A certain number of the endothelial cells may be found to contain small fat globules. Giant cells are seen occasionally. These sometimes apparently completely fill the lumina of capillaries. Still later, the endothelial cells diminish in number and the fibrous tissue increases. The late stages show marked scarring of the lung. The scar tissue is found not only in the alveolar septa, causing varying degrees of thickening, but also in large patches in which all lung architecture is lost. These lungs show only occasional traces of endothelial cell proliferation. Some areas in the later stages present only slight residual evidence of the process; but in all some scarring is evident.

The foregoing description does not include those changes that take place when acute inflammation is superimposed. A number of the dogs died of pneumonia. In them the changes were those of the ordinary bronchopneumonia with purulent bronchitis. In at least three, there are localized collections of polymorphonuclear leucocytes, suggesting an early stage of abscess. In addition one sees endothelial proliferation in most of the pneumonic lungs.

The fate of the oil itself was followed by sections stained with Sudan III. According to the indications given by our earlier work and the experiences we have encountered in previous examinations of the dog's lung, the period at which the injected fat disappears cannot be accurately set, because a small amount of free fat can be expected in the lungs of at least 20 per cent of all dogs examined. Apparently most of the fat is gone by the end of the third week, a period that agrees with the findings of other workers. Small areas of fat can be found much later; these may or may not represent the original injected fat.

In the second group of experiments (*Table 2*), the pathological changes were found not to differ with the use of other oils from those observed with the use of cotton seed oil. Endo-

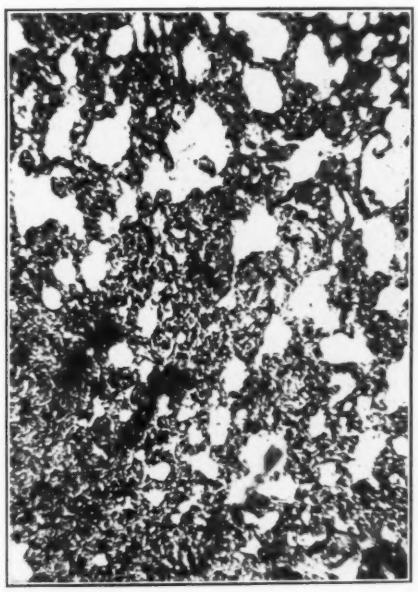

Fig. 9
Lung (L. P.). Dog No. 33, killed nineteen months after intravenous injection of 1.2 c. c. cottonseed oil per kg. Healed, with extensive scar.

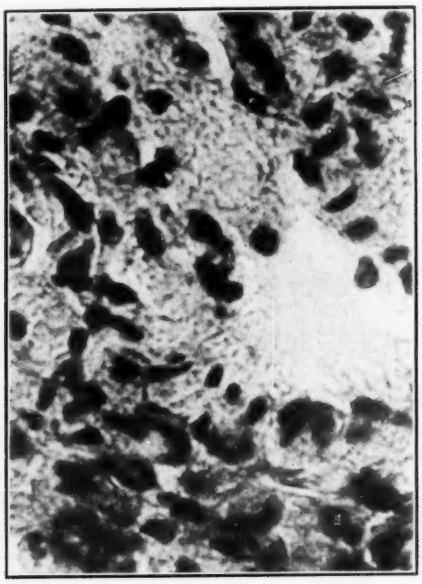

Fig. 10
Same as Fig. 9 (H. P.). Dense scar tissue.

thelial proliferation was here also the striking element in the reaction. None of these experiments was of sufficient duration to show the stage in which fibrosis might be expected to occur. One experiment in which mineral oil was employed revealed much more extensive accumulations of polymorphonuclear leucocytes in the form of early small abscesses than were seen in any other. The series is too small for any estimates of tolerance for the different oils.

CONCLUSIONS

(1) Following the primary effects of sudden extensive mechanical blocking of lung capillaries, the most striking reaction of the lung to intravenous injection of sublethal doses of cottonseed oil is seen in the prolifieration of endothelial cells.

(2) The late stages show marked scarring of the lung.

(3) In those lungs in which acute inflammation is superimposed, the ordinary picture of broncho-pneumonia and bronchitis is presented as well.

(4) Miliary collections of polymorphonuclear leucocytes in these cases are not infrequent.

(5) There is no difference in the reaction when examples of animal and mineral oil are employed.

(6) Almost all cottonseed oil disappears from the lung towards the close of the third week.

(7) Dogs will survive the intravenous injection of from 1.2 to 1.5 c. c. cottonseed oil per kg.

(8) The evidence presented is not incompatible with the conception that "ether pneumonia" and post-operative lung abscess may be initiated by the disturbances in lung circulation caused by fat embolism.

TABLE 1
Cottonseed Oil Series

Dog Number	Dosage of Oil Per Kg. In c.c.	Dogs Died Spontaneously	Dogs Killed Experimentally
27	3.0	1 hour	
35	2.5	3 to 12 hours	
36	2.0	3 to 12 hours	
32	1.7	11 days	
34	1.66	18 days	
26	1.5		At 1 hour
S41	1.5	5 days	
338	1.5	13 days	
31	1.5	121 days	
311	1.5		At 147 days
338 B	1.2	11 days	
3	1.2	11 days	
334	1.2	22 days	
165	1.2		At 22 days
312	1.2		At 22 days
16	1.2		At 28 days
333	1.2		At 28 days
301	1.2		At 35 days
342	1.2		At 35 days
304	1.2		At 60 days
33	1.2		At 572 days
29	0.83		At 7 days
30	0.8		At 7 days
28	0.34	43 days	

TABLE 2
OTHER OILS

Dog Number	Oil	Dosage Per Kg. in c. c.	Dogs Died Spontaneously	Dogs Killed Experimentally
9	Cod Liver	1.0		At 29 days
333 B	Cod Liver	1.2	22 days	
81	Cod Liver	1.2		At 15 days
146	Mineral	1.2		At 29 days
321	Mineral	1.2		At 24 days
20	Mineral	1.2	9 days	
170	Lipiodol	1.2	15 days	
16	Lipiodol	1.14	16 days	
308	Lipiodol	1.2	1 day	

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DISCUSSION (*Abstract*)

Dr. Barney Brooks, Nashville, Tenn.—I wish first to call attention to the fact that this report of Dr. Lehman's is merely a small part of the work he has done in this particular field. I think everyone who has had to do with surgery has had some experience with fat embolism. Dr. Lehman's first investigation of this subject had to do with the study of methods of producing fat embolism. His most recent contribution is a study of the tissue reactions to fat emboli.

One thing that interested me considerably was his statement that this change which is initiated in the lungs is the result of mechanical interference with the capillary circulation. This is in striking relation to some experiments in which we were interested several years ago in an attempt to study the subject of ischemic contracture in muscle. We found that obstruction of the capillary circulation initiated in the tissues an inflammatory reaction. It seems, in muscles at least, that if this inflammatory process be once initiated by disturbances of the circulation through the capillaries, it continues for a period longer than the mechanical interference with the circulation exists. From Dr. Lehman's illustrations, this is also true in cases of fat embolism.

The practical application of this work is, perhaps, not easily seen, though it may be of great importance. Certain conditions have previously been described by Dr. Lehman which bring about the coalescence of fat in the blood stream until the particles are sufficiently large to obstruct the capillaries. It may be that under such conditions we should avoid anything which would increase the fat in the blood. It is entirely possible that we could thus influence considerably post-operative lung complications.

Dr. Evarts A. Graham, St. Louis, Mo.—Much work has been done on fat embolism, but most of it has been merely a mechanical repetition of observations which follow the introduction of fat into the veins in experimental animals. Dr. Lehman's conception regarding fat embolism, which he went over briefly with you this morning, was brilliant. The principle part of it is that there is not enough fat in the largest bone in the body, the femur, to cause a fatal fat embolism. Therefore, it must be somewhere else in the body. His conception is that the fat is from the blood stream itself. The reason that fat embolism is produced is that the fine particles of fat in the blood are changed into a coarse emulsion by some agent. He found that this could be done in the test tube by anything that might occur in a severe crushing injury: crushed muscle, hemoglobin, histamin, anything that might be found in a severe injury has the property of converting a fine emulsion into a coarse one. It is easy, then, to understand how after an injury fat embolism might occur, without the necessity of incriminating merely the bone.

Most of the work done on fat embolism has been on the acute stage of the condition. I think no one else has made observations on animals some weeks or months after the fat embolism occurred. It is the carrying these experiments to their logical conclusion, not being satisfied with what has resulted at once, that is the important thing in the second contribution which Dr. Lehman has made, namely, the effect on the lungs seen after a long time following the experimental production of fat embolism. I think his additional conception that the complications of fat embolism, pneumonia, sometimes abscess, and the relatively massive fibrosis of the lung which may follow, is a brilliant one, and I think we may watch with great interest the future developments.

PATHOLOGICAL DISLOCATIONS OF THE HIP*

By A. Bruce Gill, M.D.,
Philadelphia, Pa.

This paper is based upon a study of forty-four patients that have been operated upon for pathological dislocation of the hip. In twenty-seven cases the dislocation was caused by tuberculosis of the hip; in ten, by acute pyogenic and pneumococcic infections; in five it resulted from infantile paralysis; and in two the disorganization and dislocation of the hip occurred during the course of encephalitis.

In all of these except in those due to infantile paralysis the disease caused such destruction of the head of the femur or of the acetabulum or of both, that the femur became displaced upward and backward. Such dislocation may be partial or complete. In the former type a portion of the head or of the neck of the femur may be resting against the upper portion of the acetabulum, or the acetabulum may be so destroyed that the head of the femur has slipped partly out of it. In all the trochanter with the shaft of the femur is displaced upward and the extremity is shortened.

The four groups of cases described above will be considered separately as to the pathological conditions present, the symptoms and disability that result from them, and the operative procedures that have been employed to improve the condition of these patients.

PATHOLOGICAL DISLOCATION DUE TO TUBERCULOSIS

In our experience tuberculosis is much the most frequent cause of pathological dislocations. This group comprised 60 per cent of the cases operated upon.

The age of the patients at the time of operation ranged from ten years to twenty-six years. In all the disease had begun in early childhood. Most of the patients had sinuses at some time during the course of the disease.

The extent of the destruction of the femur varied from a partial absorption of the head to complete disappearance of the head and neck. The acetabulum was always involved in the disease. Sometimes the roof had entirely disappeared and there was no evidence of any articular cartilage. At other times it had almost

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

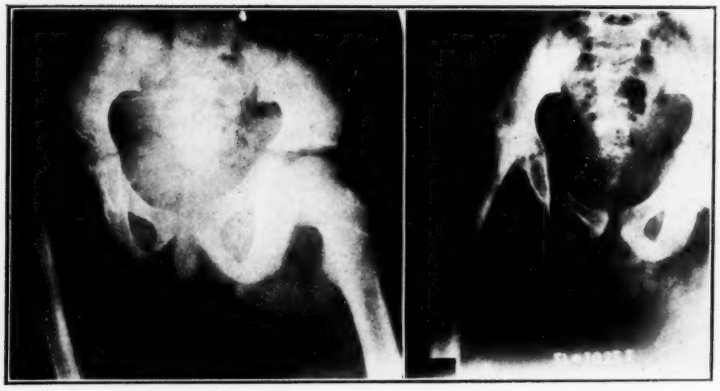

Fig. 1 Fig. 2

(Fig. 1) Dislocation of hip from tuberculosis.
(Fig. 2) Same as Fig. 1, fifteen months after operation to produce arthrodesis.

normal depth and contained a portion of the original cartilage. It was always completely filled with fibrous tissue and debris from the head of the femur. In several instances it had been perforated and in one case a large abscess was present within and without the pelvis at the time of operation. In another case a circumscribed abscess was locked up in the femur at the base of the neck.

The position of the upper end of the femur varies according to the amount of bone destruction. Usually the head and neck have disappeared and the shaft is displaced upward and backward and is fixed to the side of the pelvis with fibrous adhesions. In some cases there is no fibrous ankylosis and the upper end of the shaft is not in contact with the pelvis. In the latter type of case there is more motion than in the former. In those patients in whom clinically there seems to be firm ankylosis of the hip, motion can almost always be demonstrated under anesthesia. Tuberculous ankylosis is usually fibrous and rarely bony. Actual shortening has varied from three-fourths of an inch to four and a quarter inches. There was always marked deformity present which consists of flexion and adduction and, occasionally, internal rotation. Flexion varied from forty-five to ninety degrees and adduction up to thirty degrees.

Symptoms.—These patients complain of pain which may be occasional or frequent. It is caused by use of the leg, and becomes more marked and more disabling as the patient gets older and heavier and more active. It is sometimes referred to the region of the knee. These individuals also complain of weakness in the extremity and state that they tire easily. Disability may be partial, or practically complete. It is due to pain and to marked deformity which prevents normal weight-bearing. In some of the cases there was a history of arrest of the disease and later on a recrudescence with formation of abscess.

These patients suffer from a serious disability which interferes with their livelihood or entirely prevents it. Surgery is indicated to secure (1) stability of the hip, (2) freedom from pain, (3) correction of marked and disabling deformity, and (4) motion, if such is consistent with stability and freedom from pain.

It has long been the custom of orthopedic surgeons to confine their surgery to an osteotomy

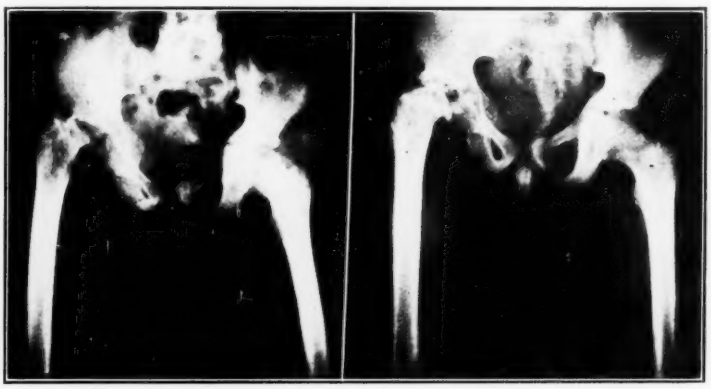

Fig. 3 Fig. 4

(Fig. 3) Tuberculosis of hip.
(Fig. 4) Same as Fig. 3, five months after operation, reconstruction of hip.

of the femur, the object of which is to correct the flexion and adduction deformity which is present. This procedure has manifest objections:

(1) One cannot correct a marked deformity by an osteotomy of the femur. In our experience we have known osteotomy to be performed two or three different times on the same patient and the deformity still to persist.

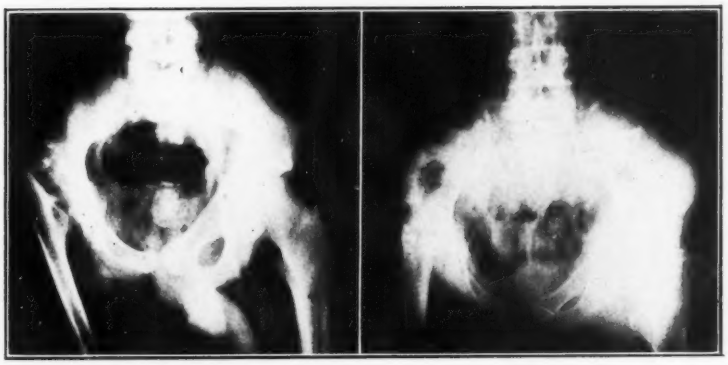

Fig. 5 Fig. 6

(Fig. 5) Tuberculosis of hip.
(Fig. 6) Same as Fig. 5, two and a half years after operation.

(2) This operation leaves intact the unstable painful fibrous ankylosis between the femur and the pelvis. The patient is unable to bear weight securely in such a false hip joint. His weight falls on fibrous adhesions which become strained. This chronic traumatism is favorable to recurrence of the tuberculous process.

(3) In those cases in which the femur is not in apposition with the pelvis, weight is borne on the soft tissues as in cases of congenital dislocation of the hip.

(4) This operation does not improve motion and does not complete the ankylosis. In the author's opinion it leaves everything to be desired. It is useful only when the head of the femur is in the socket and when the deformity is not marked. It cannot be applied to cases of pathological dislocation. The author has not employed it in this type of cases for many years.

Operations.—As was mentioned, the essential requirements are to produce stability and freedom from pain and to correct deformity. If the surgeon can secure motion without sacrificing any of the other three conditions it is desirable. The surgeon's choice, therefore, is between an arthrodesis of the hip and a reconstruction of it. The factors which would influence the surgeon to perform an arthrodesis are (1) unilateral dislocation, (2) lack of enough bone at the upper end of the femur to reconstruct a head, (3) evidence at the time of operation of granulation tissue or tuberculous pus in bone or soft tissues, (4) occupation of the patient which requires him to be on his feet much of the time doing hard work, and (5) any particular reason, such as advanced age or general debility of the patient, that causes the surgeon to fear lest in a movable hip there might be recurrence of pain or disease.

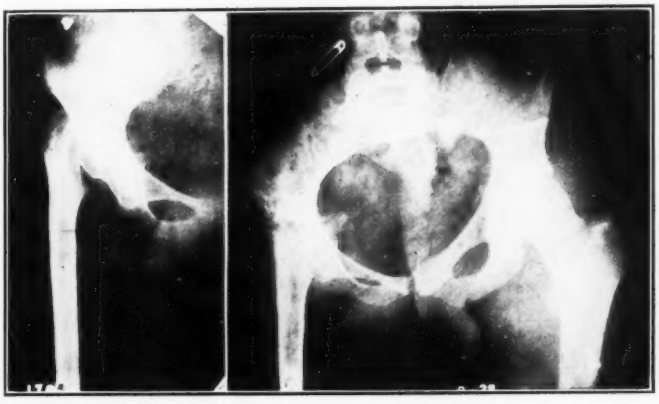

Fig. 7 Fig. 8

(Fig. 7) Tuberculosis of hip.
(Fig. 8) Same as Fig. 7, one year after operation; reconstruction of hip.

The conditions that would favor reconstruction of the hip to secure motion as well as stability are (1) bilateral dislocation, (2) long continued quiescence of disease, (3) the absence at the time of operation of all evidence of tuberculous disease of bone or soft tissues,

(4) sufficient bone to reconstruct a new head of the femur and the presence of cartilage in the acetabulum.

Reconstruction Operation.—The hip is usually exposed through a curved incision starting at the anterior superior spine of the ilium and running downward and backward below the great trochanter. The trochanter is removed with an esteotome and turned uward and backward and the acetabulum is exposed. It has always been found filled with fibrous tissue, and sometimes with remains of the head of the femur. This material is removed with a knife or scissors or curved gouge. At times it is found that the acetabulum underneath this mass is lined with good articular cartilage. If the conditions for reconstruction are favorable the upper end of the femur is shaped and put into the acetabulum. The trochanter is sutured subperiosteally to the shaft of the femur. In but two cases was the reconstructed head of the femur covered with a flap of fat and fascia as in arthroplasty.

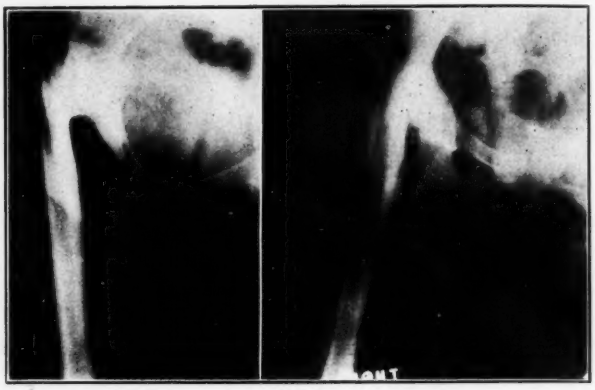

Fig. 9 Fig. 10

(Fig. 9) Old tuberculosis of hip.
(Fig. 10) Same as Fig. 9, after arthrodesis of hip.

Arthrodesis.—The hip is exposed in the same manner as above. The acetabulum is cleaned out and all cartilage removed. Its upper portion is dug up well and the denuded end of the shaft of the femur is placed within it.

In both these operations the deformity is corrected. It is sometimes necessary to divide the adductor tendons. When the end of the shaft is quite high it may be impossible to bring it down to the site of the acetabulum until a portion of it has been removed. There is difficulty encountered frequently in getting the femur downward and forward because it is held in its false position by dense fibrous adhesions. This is particularly true in cases which have suppurated for a long time. In these it is necessary to free the entire upper end of the femur from these adhesions.

The wound is closed usually with rubber dam drainage which is allowed to remain for forty-eight hours. The extremity is dressed in plaster in slight abduction and slight flexion. If we desire to secure an arthrodesis the plaster cast remains on for twelve weeks. If motion is sought it remains on for three or four weeks. After its removal extension is applied and motion begun.

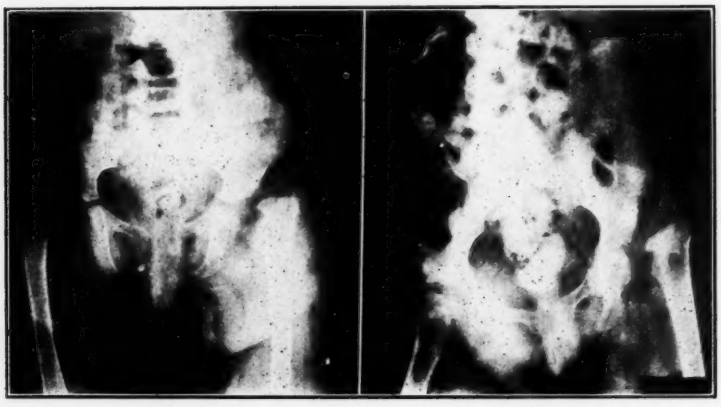

Fig. 11 Fig. 12

(Fig. 11) Double dislocation following pyogenic infection.
(Fig. 12) Same as Fig. 11, six months after operation; reconstruction of right hip.

Results.—Twenty-one cases are classed as having good results. This means that the hips are stable, painless, without disabling deformity and without evidence of disease. These patients have good use

of the extremity. Shortening is compensated by an elevation on the shoe. In ten of these there is present a bony ankylosis, and in eleven some motion is present.

In three cases the results were fairly good. The condition of the patients was greatly improved by operation. Deformity is lessened but not so well corrected as in the first group. Motion is present in all of these and there has been moderate recurrence of flexion and adduction. This occurs more readily in those cases in which there is a large amount of scar tissue about the hip produced by long continued suppuration with sinuses.

Three are classed as having poor results. One of these had persistent painful motion. An arthrodesis is needed to cure this condition. In the second, the wound broke down, owing to presence of a large amount of scar tissue, and is still discharging, but the patient has a painless, stable hip on which he walks freely. There is no evidence of recurrence of the tuberculous process.

In the third case, an adult, there was present at the time of operation a large tuberculous abscess both within and without the pelvis with perforation of the acetabulum. She had continuous pain before the operation and surgical attention was demanded after prolonged conservative treatment had failed to improve her. The abscesses were drained, the end of the shaft was placed in the acetabulum. The wound broke down and is still slightly discharging. The end of the shaft did not fuse with the pelvis, but slipped from the acetabulum. She is free of pain and will be a fit subject for an arthrodesis after the wound has been healed, as the x-ray films show that the tuberculous process in the bones is apparently healed. This case does not properly belong in this series as operation was demanded for an acute surgical condition in which disease was not quiet.

In none of these twenty-seven cases has there been any evidence of a rekindling of the tuberculous process after operation. If wounds have broken down it has not been from any condition in the bones so far as can be judged from repeated x-ray examinations.

DISLOCATIONS DUE TO ACUTE PYOGENIC AND PNEUMOCOCCIC INFECTIONS

In this group of ten cases, three occurred as the result of pneumonia and the remaining seven as the result of acute pyogenic infections, following such conditions as tonsillitis, otitis media, and suppuration of the umbilicus.

Pathology.—The head and usually most of the neck have been destroyed. The acetabulum is filled with fibrous tissue. The end of the femur is displaced to a varying degree upward and backward. Fibrous ankylosis to the side of the pelvis is uncommon. There is usually some motion present. In all of these cases a reconstruction operation was done. If the acetabulum was not deep enough to contain the reconstructed head a bone flap operation was performed to reinforce it as in cases of congenital dislocation of the hip.

Results.—Of these ten cases operated upon seven have good results, with motion in the hip. Two have fair results. In one of these the wound broke down and is still discharging slightly, although the patient has a stable painless hip without deformity on which she walks freely. The other case also had sinus formation after operation which healed after four months. The tenth patient died of acidosis two days after operation. This was the only mortality in this series of cases.

DISLOCATIONS DUE TO INFANTILE PARALYSIS

Five cases have been operated upon. In all of them the patient was unable to bear weight on the affected extremity. The head of the femur would slip from the acetabulum on any attempted weight-bearing. It could often be heard making a clicking sound when it slipped out. At times when these patients are lying on the table the head of the femur can be put in and out of the acetabulum at will. The acetabula are poorly developed. The relaxation of muscles and ligaments which has resulted from infantile paralysis allows luxation to occur. It is of course possible that there is a primary congenital defect in these acetabula but in all of these five cases there was no history of luxation until after the patient had infantile paralysis, and it seems probable that the absence of weight bearing from early childhood is a contributing factor

Fig. 13
Disorganization both hips accompanying encephalitis.

in the defective development of the hip joint. The author has done an arthrodesis of these hips when the extremity is completely flail, without any power to control motions in the hip joint. When there has been flexor and extensor power at the hip the author has reinforced the acetabulum by means of the bone flap operation as described by him for congenital dislocation of the hip. Of these five cases one relapsed, apparently because the bone flap did not remain in place over the head of the femur. The operation will be repeated, with promise of satisfactory result. An arthrodesis was done in two hips with splendid result. The patients are able to stand without support. They feel a stability which they did not have before and are free from the pain which occurred when the hips became dislocated. The other two cases of reconstruction by means of bone flaps have been greatly improved by the operation.

DISLOCATIONS DUE TO ENCEPHALITIS

The two cases in this group are extremely interesting.

One patient, a young woman, was in a nurses' training school at the time she was taken with maniacal encephalitis in February of 1918. She was in the hospital for ten weeks and then removed to her home while still ill. Later it was discovered, in June of 1919, that there was an abscess in the region of the left hip. This was incised and drained for two weeks. It then healed. Cultures of the pus were made and proved to be negative. Shortly after this a similar condition was found in the region of the right hip but the abscess was not opened and eventually it was absorbed of itself. There was complete disorganization of both hip joints, with marked upward displacement of the remains of the femur. The patient never seemed to suffer any pain in either hip and the condition was discovered accidentally.

The other patient in this group lay for months with encephalitis in one of the Philadelphia hospitals and it was discovered during his convalescence that he had a pathological dislocation of the left hip. X-ray showed complete disorganization of the joint. The patient had never suffered pain. There had been no incision of any abscess.

These two cases apparently occurred during the course of encephalitis. The disorganization and dislocation of the joint was discovered accidentally. In the one case in which the abscess was opened there was no infection present. Whether there had been infection which died out it is impossible to say. There seems a possibility that the conditions may have been trophic, resembling the arthropathies of certain diseases of the nervous system. Reconstruction was performed on all three joints. The girl with the dislocation of two hips has had a good result in the one hip, in the other hip the dislocation has recurred. The other patient had a good result.

CONCLUSION

Pathological dislocation of the hip presents many of the same problems and difficulties as old unreduced congenital dislocations. The average of good results obtained by operation justifies surgical procedure. This statement holds true in tuberculosis of the hip as well as in other conditions of the hip. A surgeon may secure either an ankylosed hip in good position or in favorable circumstances may secure enough motion to be valuable.

DISCUSSION (*Abstract*)

Dr. A. Bruce Gill, Philadelphia, Pa.—It is not desirable to use great force in placing the femur in the acetabulum as ankylosis may result if this apposition is maintained in marked tension.

Plaster is applied to maintain the extremity in ten or fifteen degrees of abduction and ten or fifteen degrees of flexion. If a movable hip is desired as the result of operation the cast is removed in three or four weeks. Buck's extension is applied and motion begun. Attempt is made to maintain the abduction by means of the extension.

HAIR-BALL, WITH CASE REPORT*

By Louie Limbaugh, M.D.,
Jacksonville, Fla.

Hair-ball of the stomach, or trichobezoar, is a relatively rare condition. In 1921, Davies[1] presented a very comprehensive study of the condition in the *Lancet*, reporting two cases and abstracting 108 cases. So recently as February of this year a case was reported by Langfitt[2] in this Country.

Unlike other foreign bodies in the stomach, which are less uncommon, hair-ball occurs more frequently in persons of normal mentality than in the insane. The latter may swallow hair, but usually other foreign matter is incorporated in the mass. Hair swallowing is more commonly seen in females, their longer hair being more accessible. Further, it is more common in girlhood, though Armai[3] in 1927 reported a case in a 38 year old woman. This was a case of congenital syphilis and there may have been a mental factor present. Children are more prone to form habits and hair swallow-

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ing probably follows an acquired habit of chewing on hair ends and biting off strands and twirling them around with the tongue. Certainly it is not always a conscious act. It is interesting to note that though the habit of swallowing hair may date back for several years, the usual operative finding is a single hair mass, forming a rather perfect cast of the stomach, even molding to the shape of the pylorus.

Reported casts have varied in size from a weight of a few ounces to that of 6.5 pounds. Though these cases all have many symptoms and physical findings in common, they are frequently diagnosed only at operation. The patient does not associate her distress with hair swallowing and the fact is not brought out save by direct questioning. It is hardly a routine question in acute abdominal disorders. It, therefore, most frequently falls to the roentgenologist to make the diagnosis. The value and practical application of x-ray studies which have been realized and developed in the past two decades have enabled more recent cases to go to the operating room with a correct diagnosis. Screen and film studies give typical and distinctive findings so characteristic as to make the diagnosis essentially a certainty. A history of hair swallowing over a period of time cancels any former doubt, though it is to be remembered that such a habit on the part of the patient may be persistently and emphatically denied.

It is remarkable how long hair swallowing may be practised without causing any symptoms. Transient symptoms often occur which are not severe and the real underlying cause may not be ascertained until sufficiently severe and acute symptoms have occurred to cause the patient to seek medical advice. The mass itself may be accidentally discovered before any cause for complaint has occurred.

Treatment is, of course, surgical. It is indicated promptly, as ulceration of the gastric mucosa may occur. Perforation and also obstruction are liable.

CASE REPORT

L. P., a white girl, age 11, was admitted to St. Vincent's Hospital April 12, 1928.

She had become ill two years before with chills and fever. She was treated with quinin and promptly recovered. While bathing the patient her mother noticed a lump in the abdomen. It was thought by her physician to be the kidney and no especial significance was apparently attached to it. The mother continued to observe the mass, which did not become larger nor was it ever tender. At the time of the chills and fever mentioned there was also intense epigastric pain, nausea and vomiting every two or three weeks of but a day's duration and never associated with fever until the present attack. This had its onset five days before admission to the hospital and the pain had been most intense. Nausea and vomiting were persistent. She had been unable to take any nourishment and but little water.

The family history was unimportant.

Save for measles, pertussis and varicella, all uncomplicated, she had never been acutely ill. She had been anemic and undernourished for several years. She had gained no weight for two years. Her mentality was good, with normal progress in school.

On admission the patient was moderately emaciated. The mucous membranes were anemic. She had the appearance of rather marked dehydration. Her temperature was 100°, pulse 80, and respiration 20. The nose and throat were negative. There was no general adenopathy. Heart and lungs were normal. The abdomen was of the scaphoid type and presented a visible tumor mass lying transversely across the epigastrium and moving with respirations. On palpation, this mass was firm and of smooth surface. It was oblong in shape, though apparently irregular in outline, and was freely movable. Pressure over the epigastric edge or end of the mass elicited marked tenderness, though

Fig. 1
X-ray film, twenty-four hours after barium meal, showing barium coated hair ball.

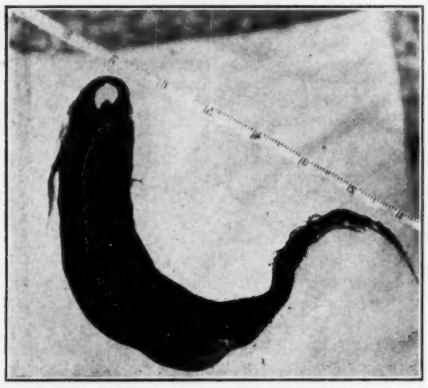

Fig. 2
Photograph of hair ball after removal.

pressure directly over the mass caused no distress. Splenic dullness was normal. The kidneys were not palpable. The liver did not give evidence of enlargement. The urine was normal. White blood count was 21,700 with 90 per cent polymorphonuclears.

Dr. R. B. McIver, of the Surgical Staff, saw the patient in consultation and gave the opinion that the stomach, rather than any other viscus, was involved. It was decided to have an x-ray study with a barium meal, though the leucocytosis caused some concern. She was seen by Dr. W. McL. Shaw, Staff Roentgenologist, who made the diagnosis. Circumstances then permitted several days' roentgenological study of the case.

X-Ray Report.—With the screen the mass in the abdomen could not be seen. The barium meal showed the esophagus normal. The stomach filled in an atypical manner, the barium pocketing in the cardiac end and slowly seeping down around a large elongated mass. Most of the barium passed down along the greater curvature. This mass was seen to be in the stomach and to be movable. It was manipulated up and down in the barium-filled stomach before the fluoroscope and presented a rather startling appearance with its upper end coated with barium protruding above the level of the barium in the stomach. Films made at this time and for five days after taking the meal showed a large mass, producing pressure against the barium in the entire stomach. At the end of four hours the stomach was empty of free barium, but a large mass, taking its shape, was left coated with barium. This mass also extended through the pylorus and well into the second portion of the duodenum. It had the characteristics of a very large hair-ball. As measured on the films it was 22 cm. long, 4 cm. wide and 2 cm. thick. The duodenal cap, or first portion, was markedly enlarged; also the entire stomach, when filled with barium, was very large.

The hair-ball retained barium in its texture for five days and at that time very definite lines of structure were noted. Its shadow was growing slightly smaller daily. Films were made at four hours, nine hours and twenty-four hours following the original meal and twice daily for five days. All films showed the barium-covered mass, which was taken to be a large hair-ball. The stomach was tender in the region of the pylorus and first portion of the duodenum. It was thought there might be some local pathology at that point.

Treatment.—The patient was able next day to retain liquids in small amounts and several days were given over to combating the dehydration and to supplying needed calories. Operation was performed by Dr. McIver under gas-ether anesthesia. With a midline incision in the upper abdomen, the anterior wall of the stomach was delivered and the viscus opened through a two-inch transverse incision parallel to the vessels and at the juncture of the middle and lower thirds of the organ. A sausage-shaped hair-ball was found in the stomach, one end engaged in the pylorus and first portion of the duodenum. This was removed with sponge forceps. The opening in the stomach was closed by three layers of plain catgut. The abdominal wall was closed anatomically. One rubber dam drain was used. The hair-ball weighed 200 grams. Prompt recovery of the patient was uneventful.

The high leucocytosis and the extreme tenderness of the mass seem to be the rather unusual incidents of this case. But quoting Davies,

"The most striking impression obtained from the published records of 'hair-ball' of the stomach is the free mobility of a hard, smooth mass on manipulation. If this fact is borne in mind, then the possibility of hair-ball will be remembered and a diagnosis can afterwards be definitely established by radiography."

After the diagnosis was made in this case the patient was questioned relative to hair swallowing and readily admitted that for about eight years she had had the habit of biting off hair strands and swallowing them. The child's mother gave the information that the child had been found asleep at night with hair in its mouth. She has been duly impressed and a cessation of the habit is hoped for.

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UNUSUAL EAR CASES: SALIVARY FISTULA OF MASTOID REGION; BILATERAL CYSTS OF EXTERNAL AUDITORY MEATUS*

By W. Likely Simpson, M.D.,
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Case 1.—Miss R. B., 22 years old, was first seen November 1, 1928, with the history of having had a simple mastoid operation on the right ear two years previously. The mastoid wound healed normally, but since the operation there had been a flow of saliva from the lower part of the wound. The flow of saliva was very annoying, especially at meal time. It was necessary to change dressings at frequent intervals on account of the constant flow of saliva. On December 6, 1926, under gas anesthesia, an incision in the right mastoid wound in the region of the fistula was made. No definite fistula could be followed. A small amount of soft tissue was removed. The soft tissue was closed with catgut; the skin with metal clips. Dressings of moderate pressure were applied. The skin clips were removed on the fifth day. The wound healed without further discharge of saliva.

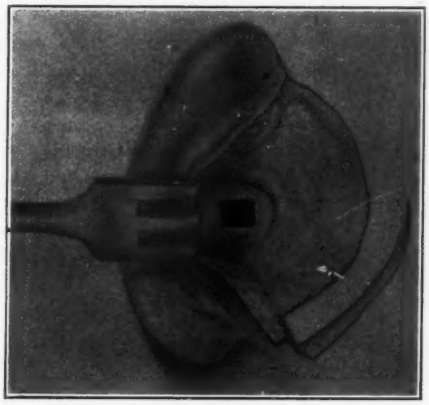

Fig. 1
Operative field showing opening in the meatus; also flap cut to close same.

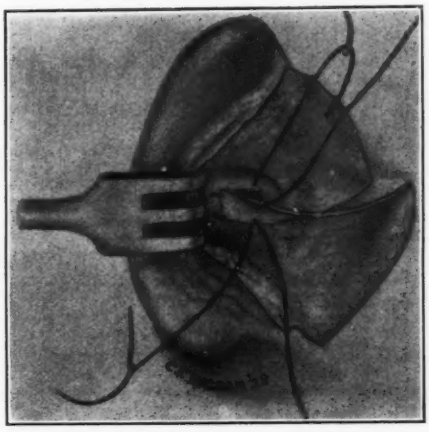

Fig. 2
Flap closing opening being sutured in position.

Fig. 3
Low power of cross-section of cyst.

Case 2.—Miss M. M., 20 years old, came to the

Fig. 4
Moderate power of cross-section.

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Fig. 5
High power of cyst wall.

Clinic August 25, 1926, with a history of having had two operations on the left ear for a cystic condition of the external auditory meatus. For one year there had been a mucous discharge from the left mastoid region. At the time of examination there was a dark area in the mastoid region, left side, in which there was a fistula with mucus discharging from it (site of previous incision). A probe could be inserted about one inch superiorly and anteriorly. The x-ray showed no involvement of the mastoid bone. There was slight swelling of the external auditory meatus. On August 31, 1926, under local anesthesia with the aid of methylene blue which had been injected into the cyst, the cyst was removed and the wound closed without further trouble.

On February 16, 1927, after I had observed an enlargement of the posterior wall of the external auditory meatus of the opposite ear which had gradually increased in size, I removed a drachm of straw colored fluid from a cavity with a small needle through the external auditory meatus and immediately afterward the sac was filled with methylene blue. The cyst was removed through an incision as in the ordinary mastoid operation. The cyst was easily dissected from the surrounding tissue except anteriorly where it was closely attached to the skin of the meatus. The skin was removed over an area about one-half inch square. To close this opening in the canal a flap of skin was carried forward from the lower part of the mastoid region from the posterior lip of the primary incision and attached to the internal superior and inferior edges of the opening in the external auditory meatus. This flap was left attached at the upper end in its original position. The wound was closed with metal clips. Six days after the removal of the cyst the wound was again opened and the flap cut posteriorly from its attachment to the skin and also cut anteriorly where it had been attached to the opening in the meatus. Three sutures were used at this time to attach the skin to the opening of the meatus externally. An uneventful recovery was made.

Bilateral cyst formation must be due to a congenital condition, as it does not seem possible otherwise that two cysts of identical structure would form simultaneously in the same location. The methylene blue was of considerable aid in outlining the exact extent of the cysts, and facilitated their removal. The cyst of the right meatus was so much a part of the canal that removal of quite a large area of the skin and cartilage was necessitated. The closure of this opening was made possible by the plastic operation above described. It seems to me that a similar flap might be used to advantage in plastic work of the external auditory meatus.

In the case of the salivary fistula of the mastoid, the report is not made on account of any special operative technic, but to emphasize the ease with which the closure was obtained, on account of the rarity of the condition; and to bring before you the possibility that this condition may arise after any mastoid operation.

LEG LENGTHENING*

By W. B. Carrell, M.D.,
Dallas, Tex.

With the ever-increasing volume of surgical literature, it becomes more imperative that a new operation, or new principle in procedure, be submitted to other surgeons than the author for careful study and successful application before it shall be accepted as a routine measure. Too often we are prone to try out in an imperfect way some method proposed, and with poor results condemn it, when the ideas of the author were in no wise understood and he, were he present, would not recognize the operation as the one he had planned.

It is with this in mind that I wish to comment on the operation of leg lengthening in the manner proposed by a member of our Section. Leg lengthening operations have been more or less successfully done by various surgeons, but do not seem to have reached a rational basis until Dr. Putti contributed the principle of traction and counter-traction by means of pins inserted

*Chairman's Address, Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

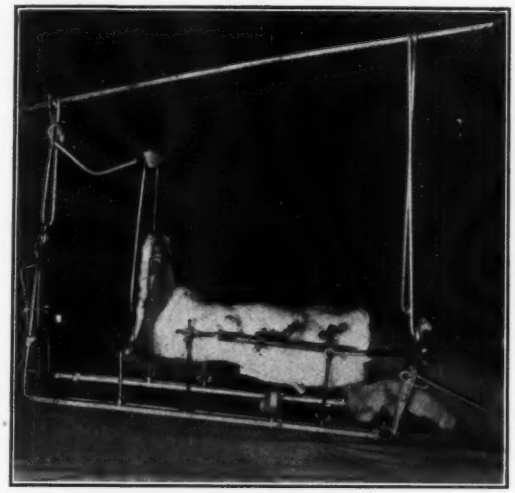

Fig. 1
Apparatus for leg. Slight modification of Abbott's splint. Double track one-piece splint.

into the fragments and separated by an expanding side bar. I became interested in this work and lengthened two femurs, one an inch and the other one and one-half inches, but there was so much angulation of the fragments that healing was delayed and no other cases were attempted.

There is a well defined indication for an operation of this character and the improved function is evident, not only in the changed gait from an added two or three inches to the length of a short leg, but also in the postural effect of shifting the pelvis to a horizontal plane, and relieving the spine from the compensation curve necessary in the short leg patient. Lifts under the shoe are undesirable and frequently cannot be worn if the leg has impaired stability following poliomyelitis.

It was therefore gratifying to see in the work of Dr. Leroy Abbott a new principle added to the operative technic which gave promise of making it a worth-while operation. I went to see Dr. Abbott do the operation and studied the post-operative care in the hospital wards. This is mentioned to observe that in my experience a visit to a surgeon who is doing a new work has invariably revealed some detail shown to have an important bearing on successful performance which was missed or not fully appreciated when reading the article.

When we began doing the operation two years ago, the apparatus seemed less suitable to femoral lengthening than for the tibia, for which it had been specifically designed. For several months tibias only were operated upon, but, finding it desirable to lengthen the femur in some cases, we independently made modifications to meet this need, and without in any manner changing the principle, have devised a simple apparatus, comfortable to the patient, and offering little interference to nursing care (*Fig. 1*).

During the past two years we have lengthened the tibia in twenty-one cases and the femur in seven. Twenty-six were shortening from poliomyelitis, one from an old tuberculous hip, one from epiphyseal damage due to a giant cell tumor at the end of the femur. The average length attained was one and three-fourths inches. The greatest length was three and one-half inches. In tibial lengthening the details described by Dr. Abbott were accurately followed, with the exception of the addition of a third pin. After doing a few cases we found that it was difficult to maintain a good contact, because the lower end of the upper fragment had a disposition to project forward under the skin and in one instance was almost through before it could be controlled. This led to our adoption of a third small pin placed at a mid point between the other pins, but not penetrating the bone. This pin is attached to the side bars and has at its center a section of one-half inch flattened, and in a saddle shaped curve to fit over the tibia, so that the pin does not itself bulge under the skin in front of the tibia. Should it

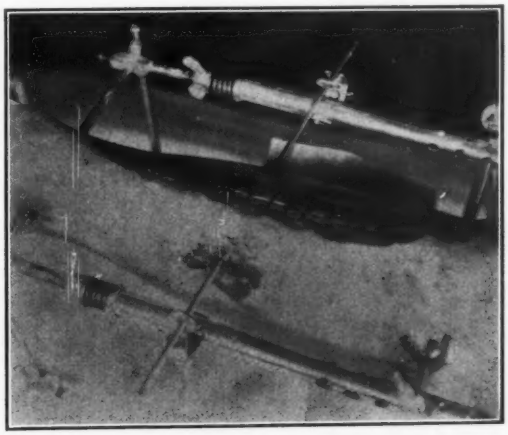

Fig. 2
To show position of third or middle pin. (Apparent abrasion around pins mercurochrome.)

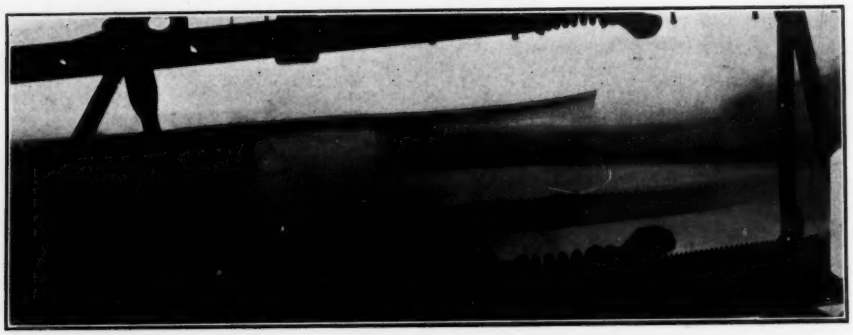

Fig 3
Angulation of upper fragment, difficult to control with two pins.

be unnecessary to exert pressure on the fragment, the pin rides harmlessly through the lengthening process.

In the series of 27 tibial operations there were four complications, three of which were avoidable, but all influenced unfavorably the final result. In one case we waited ten days before starting traction and the fragments were so firmly fixed that extreme pressure failed to move them. This was a complete failure and could have been avoided if traction had been started on the fifth or sixth day, as we now do routinely. Another case, practically a failure, had the upper pin placed so near the epiphysis that when heavy pressure was applied it broke through the anterior surface and only one-half inch length was obtained. The remedy for this error is obvious, but serves to show the importance of placing the pins at a proper position in the bone. The third complication was in a faulty osteotomy of the fibula. The periosteum was not divided, or the bone was not completely cut through, and during the lengthening process the fibula moved away from its normal attachment on the side of the astragalus to a higher position, permitting a valgus deformity of the ankle. It was later recalled that the patient had complained of pain at the ankle throughout the treatment, but inspection of the pin did not reveal the cause of it, and nothing unusual was observed until the full two inches had been gained and all dressing removed from the ankle. A subsequent plastic operation will be required to correct this deformity. Needless to say, in subsequent cases we have not only inspected the operative field over the tibia, but without disturbing the dressings around the pins have observed the position of the malleoli as the lengthening progressed.

The fourth complication caused a complete failure in gaining length. On the fifth day, and immediately after tightening the screws on the side bars, there was a severe hemorrhage coming through at the site of the upper pin, on the inner side. After three days of rest, movement again caused hemorrhage, and with a third re-

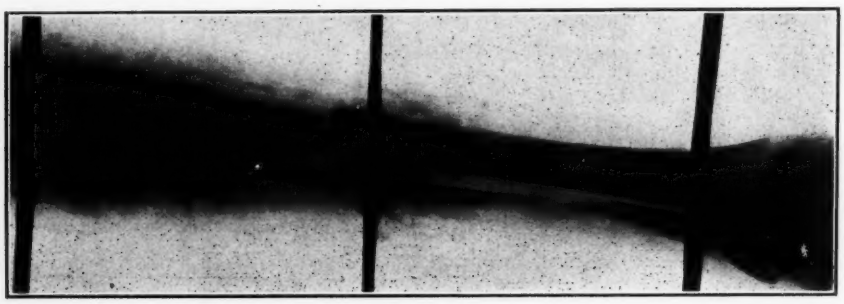

Fig. 4
Angulation of upper fragments under control of the third pin resting directly on surface of bone.

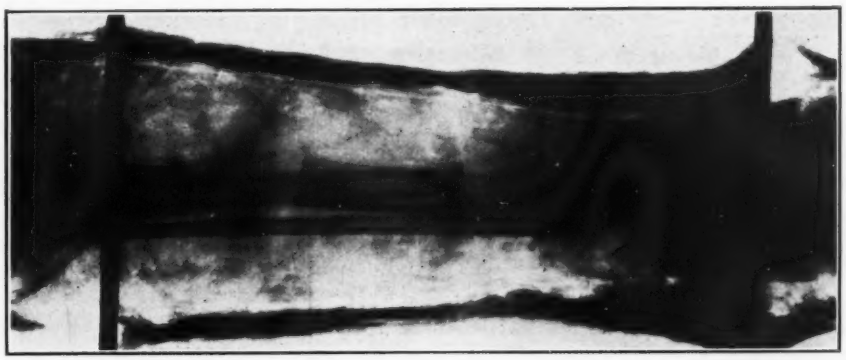

Fig. 5
On completion of lengthening, plaster incorporating the pins is a more comfortable dressing. Holds position until union is firm.

currence two days later, the pins were removed and the operation abandoned. It was believed that the posterior tibial vein had been damaged at the operation and the stretching had caused a laceration in the wall with recurrence after each fresh trauma.

In the four cases with complications, two were complete failures. One gained only one-half inch and the other obtained full length, but has deformity at the ankle which can be corrected. The remaining seventeen cases secured the full length planned for, which in many of them was enough to make the legs equal in length. There were no infections other than moderate local irritation where the pins came through the skin. Dressings surrounding the pins at this point were left in place from the initial dressing until full length was obtained.

We observed in some cases an increased

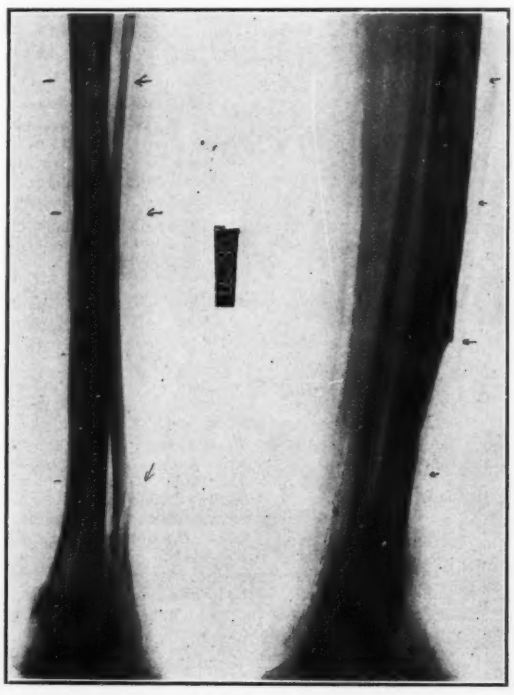

Fig. 6
Six months after operation. Firm union in both bones.

Fig. 7
Two years after operation.

Fig. 8
Two years after operation.

relaxation of the knee joint after operation, and concluded that it was due to stretching the ligaments when the joint was in too much flexion. It did not occur when the leg was fixed in extension.

A fifth complication was so much the patient's fault that we have not charged it against the statistical report of cases. An adult, after two inches of lengthening had been obtained, was permitted to leave the hospital immediately with a plaster dressing incorporating the pins, and at home, without our knowledge, he went about on crutches with weight bearing for four weeks with a painful area on the front of the leg. When he came in the plaster had produced pressure necrosis over the anterior fragment and necessitated subsequent removal of sequestra when union had occurred. Almost the full extent of the length was preserved. These complications have impressed on us the necessity for scrupulous surgical technic and close attention to mechanical details in providing proper apparatus for the operation and complete control of the patient during convalescence. The case reported with three and one-half inches of lengthening deserves particular mention, because this extreme length was obtained in a leg with firm muscles where the shortening had come from bone injury and not from poliomyelitis. In the post-operative care we have found it more comfortable for the patient to have a plaster applied with pins in place seven to ten days after the lengthening is complete. When the plaster is dry the pins are cut flush with the plaster, so the patient may turn in bed and be up in a wheel chair.

From an analysis of our cases we are convinced that leg lengthening, both in the tibia and femur, is feasible, and meets a well defined indication in surgical procedure. We are, however, in agreement with the author of the method used that it is a major operation, requiring unusual surgical technic, and should not be undertaken unless the surgeon has a dependable house officer who will become interested in the post-operative details. The operation is not difficult to perform, does not require unusual time, does not shock the patient appreciably, but the mechanical details at operation and subsequent to it are exacting, and unless carefully followed serious complications may ensue.

DISCUSSION (*Abstract*)

Dr. J. Albert Key, St. Louis, Mo.—This is Dr. Abbott's operation, so far as the Shriners' Hospital for Crippled Children is concerned. It was his idea and his courage which did it. I have done a few. The last word, so far as we are concerned, has not been written on leg lengthening. It is still in the experimental stage.

The more men who do this, that is, the more competent men, the sooner we shall have a standardized method which will be as near fool-proof as the average measure in bone surgery is.

We have some complications, too. It is a question of doing the operation carefully and then of eternal vigilance after the operation is performed until the pins are removed.

Now, one thing, perhaps, that we learned very early was that not only the periosteum but the interosseous membrane in the leg must be cut. We found the operative procedure in the leg is easier than in the femur. On the other hand, the lengthening in the leg is much more difficult than in the femur. We tried various methods to prevent tilting forward of the upper fragment, moving the foot up and down and bending the knee up and down. None of them was entirely satisfactory. We have been using three- and four-pin methods which were devised by Drs. Crego and Adams, associate surgeons of the Shriners' Hospital. In the femur the difficulty, of course, is in getting the upper pin in and surrounding it by muscles to prevent its coming in contact with the large vessels in the upper thigh. Four pins in the femur is too difficult an operation; that is, it is a very difficult operation and two pins work very well.

You notice that Dr. Carrell's apparatus has not any

springs. Dr. Abbott's apparatus has springs, but when we tested out the springs we found our springs were so stiff that we have been practically doing just what he has been doing. We are now using weaker springs. We thought we were getting spring traction, but we were not.

I should like to warn against something which we did. We decided to put a screw in to hold the two fragments together and maintain the lengthening. The screw was put in through a longitudinal incision and the skin sloughed between the screw incision and the operative wound. The bone did not become infected, but I think this plaster of paris with the two pins in place will probably be the ultimate solution of the problem of maintenance of length until union is solid. I do not like the pin over the tibia. Dr. Carrell has not had any trouble, but I am afraid that if many of us do it, we shall have.

SUPRAPUBIC PROSTATECTOMY WITH LOCAL ANESTHESIA AND A NEW TECHNIC*

By EDGAR G. BALLENGER, M. D.,
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and
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Because of the inaccessibility of the prostate gland local anesthesia has been employed only to a limited extent in suprapubic prostatectomy. The enfeebled condition of many patients needing relief from prostatic obstruction makes it extremely desirable to use an anesthetic which produces the minimum disturbance. When feasible to use, local infiltration with novocain or similar drugs is generally considered the safest form of anesthesia.

Several years ago when sacral anesthesia came into vogue, we began to employ this method for selected patients upon whom prostatectomy was to be performed. Owing, however, at times to the failure of sacral anesthesia to give the desired effect, the periprostatic tissues were then infiltrated with novocain. We used for this purpose a long needle guided by the forefinger. The local anesthesia obtained after such infiltration of the prostatic socket led us to extend the use of this method and to omit the sacral injections.

*Received for publication January 5, 1929.

The difficulty of holding upward intravesicular enlargements of the prostate with the finger and needle while injecting the area beneath the snout-like projections caused us later to employ a hollow metal tube through which the needle was guided to the area to be infiltrated. Long needles guided alone by the finger were found, at times, to pierce the glove or to traumatize the bladder mucosa or prostate. The rigid tube with rounded end was free from these objections and, furthermore, made it quite easy to select areas for infiltration with novocain. The long needles employed through a speculum or a panendoscope could not be inserted with the accuracy obtained by placing the end of the tube at the point to be infiltrated. The repeated use and the ease with which the end of the tube could be placed in positions not otherwise reached with needles alone, finally led us to adopt the routine use of local anesthesia for prostatectomy, utilizing the tube as a guide to the periprostatic areas. The tube employed is about the size of a No. 20 catheter; one end is blunt and well rounded while the other end is

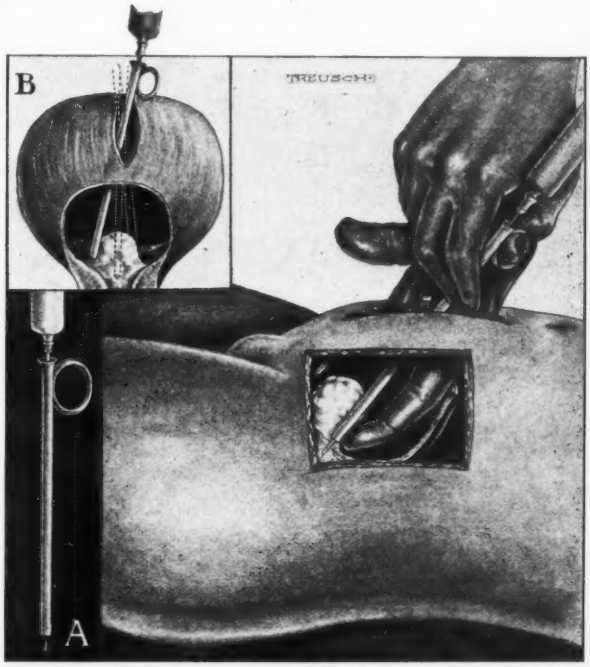

Illustration showing tube in use to guide needle to periprostatic areas for infiltrating with local anesthesia. Insert A shows tube, needle and syringe. Insert B gives anterior view of hypertrophied prostate.

slightly flared to facilitate the insertion of the needle.

Technic.—Having completed the suprapubic cystotomy the forefinger guides the tube to the junction of the bladder with the prostatic mass; the tube is then pressed against the area to be infiltrated. A needle, 3 cm. longer than the tube, is inserted through the lumen of the tube into tissues for about 1 cm. beneath its lower end and 3 c. c. of a 1 per cent solution of novocain are injected; the needle is then carried a little deeper and about 3 c. c. of the novocain solution injected. The injections are facilitated by the operator placing the tube in different areas and having an assistant to inject the solution. The infiltration of the tissues receiving the novocain may be felt by the finger at the end of the tube. Without removing the tube or finger from the bladder the injections are repeated until a circular area around the prostate has been infiltrated at points corresponding approximately on the face of a clock to the hours of 1, 3, 5, 7, 9, 11. One injection is then made into the posterior urethra, as deeply as the tube can be conveniently inserted. Within five minutes the anesthesia is adequate for the removal of the prostate. Even when the median lobe projects well into the bladder, the tissue beneath it may be thoroughly infiltrated by holding the snout-like mass upward with the tube as the injections are made.

Preparatory Treatment.—A preliminary hypodermic of morphine (gr. 1/6) and scopolamine (gr. 1/150) should be administered one hour before the operation and, if within 45 minutes the patient is not obviously drowsy, a supplementary injection of morphin gr. 1/6 should be given.

Extra blankets or pads should be placed under the patient in order that he may not be uncomfortable on a hard operating table.

The procedure followed in anesthetizing the lower abdominal wall varies slightly according to whether the operation is done in one or in two stages. In the one stage operation the usual intracutaneous injections are made; the incision is then carried through the skin only, and all subsequent infiltrations of novocain are done through the incised area, thus eliminating additional skin punctures. The injections are given in each side well into the subcutaneous tissues and in the mid-line under the facia, into the muscle, prevesical space and dome of the bladder.

Fifteen minutes before the patient is brought into the operating room a catheter is introduced, the urine drawn off and one ounce of a recently prepared solution of novocain, 3 per cent, and colloidal silver chloride, 5 per cent, is injected into the bladder where it is allowed to remain while the lower abdomen is being anesthetized.

If it is the second stage, the dressings are removed before the patient is brought into the operating room and a 5 per cent solution of mercurochrome is applied to the field of operation and a light gauze dressing; a further application of mercurochrome is made after the patient is placed upon the operating table.

Infiltration of the peri-prostatic tissues with novocain, as above described, afforded surprising freedom from pain during enucleation of the prostate; and, furthermore, since the field of operation was blocked, shock and other post-operative disturbances were definitely lessened.

MASSIVE ATELECTASIS*

By C. H. Cocke, M.D.,
Asheville, N. C.

So-called "massive collapse" of the lung was first described by the Englishman, W. Pasteur, in the year 1890. It is not necessary here in the limited time allotted me more than briefly to allude to the rapidly growing literature, since the condition is quite commonly recognized as reported today. That type known as post-operative "massive collapse" has received ample discussion, though the explanation of its mechanism is still forthcoming. Nor has a uniform classification been accepted, each writer adopting the one best suited to his tastes and evolved from his experience and ideas. Roughly, the following groups of cases may be not infrequently met with:

(1) Pasteur's post-diphtheritic diaphragmatic paralysis.

(2) The post-operative cases and following chest wounds, penetrating and non-penetrating.

(3) Those due to obstruction, such as tuberculomas, neoplasms, foreign bodies, or mucous secretions.

(4) Those due to infections: diaphragmatic pleurisy, pneumonia, purulent bronchitis, tuberculosis.

(5) Congenital.

This classification is not intended to be either definitive or all-inclusive. It immediately sug-

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Fig. 1
M. E. H. March 10, 1927. Complete homogeneous opacity of left lung.

gests, however, the propriety of continuing the use of the term "massive collapse." It is in no sense of the word a true collapse. It is not attended with a positive intrapleural (extrapulmonary) pressure, but rather with a marked accentuation of the negative pressure. It is not yet proven that there is necessarily a bronchial obstruction present, though the most recent studies of Lee and Jackson would suggest such a possibility. The condition is really a true airlessness of the lung tissue, or atelectasis. Further, the condition varies in degree from a mere lobular atelectasis to a lobar or total atelectasis of one lung. A further interesting and puzzling feature of the cases following thoracic wounds (and it may follow with such dramatic suddenness that the possibility of infection's being the etiological factor can be ruled out) is that the condition may be homolateral, contralateral, or bilateral. The condition is commonly acute, though it may develop chronically, as I shall show you later.

Symptoms.—These are, in the acutely developing (say post-operative) case, briefly, pain present or absent; if present, usually sharp; cough, non-productive, then later mucoid, and finally muco-pus, not bloody or prune juice, which is important in differential diagnosis.

Tachycardia is usually quite marked. Dyspnea depends largely on the degree or extent of the atelectasis. Cyanosis is usually quite definite. Temperature is up several degrees, to 101 or 103° F. The white blood count is up to 20,000. Usually the condition is acute, though again the onset may be quite gradual.

Signs.—These are marked immobility of the affected side of the chest, narrowing of the interspaces on this side, dullness to flatness over the affected areas and possible hyperresonance elsewhere. Vocal fremitus is increased and then diminished. Eventually there is absence of all true vesicular breathing; only tracheal or cavernous breathing is heard. There is absence of adventitious sounds; usually marked retraction of the trachea and the heart to the affected side; and a high immobile diaphragm.

The remarkable thing is that such a picture develops rapidly in a patient whose respiratory apparatus has for all practical purposes been intact just previously. Such a picture is for all practical purposes pathognomonic.

The differential diagnosis must be made from:

(1) Acute dilatation of the heart.
(2) Pulmonary embolus.
(3) Pulmonary infarct.

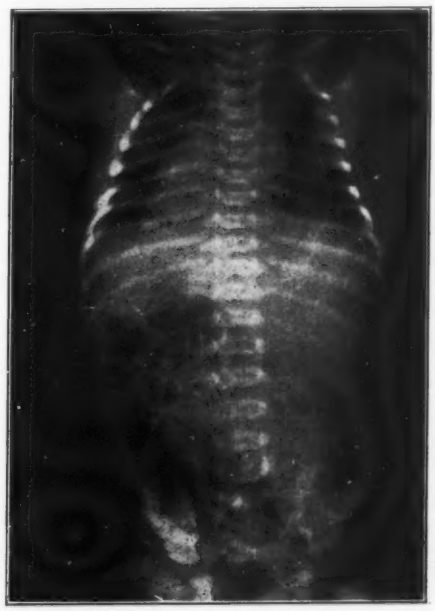

Fig. 2
M. E. H. March 16, 1927. Complete clearing of left lung.

Fig. 3
W. T. C. July 11, 1927. Apparently normal chest with heart in correct position.

(4) Pleurisy with and without effusion.
(5) Pnuemothorax.
(6) Diaphragmatic hernia.
(7) Especially, pneumonia.

And once the diagnosis is made, speculation as to its cause is a delightful pastime.

Case 1.—M. E. H., a female infant, was born March 6, 1927, after a normal delivery, and appeared normal in all respects. There were no abnormalities or birth injuries. There was equal expansion on both sides of the chest and the breath sounds were good. She was apparently a perfectly normal baby until the beginning of the fourth day, at which time she became acutely ill. There was a rise of temperature, rapid pulse, dyspnea, cyanosis, temperature to 102° F. with the entire left chest, anteriorly and posteriorly, flat to percussion with very distant breathing and no rales heard. There was a little patch, thought to be a pleuritic rub, to the left of the nipple. The right lung was hyperresonant.

The blood showed hemoglobin 95 per cent, 4,800,000 red blood cells, 22,500 white blood cells, with a differential count of 56 per cent neutrophils, 29 per cent small lymphocytes, and 15 per cent large mononuclears.

X-Ray.—(*Fig. 1*). Pictures were made as shown and because of the insistence of one of the consultants and the roentgenologist that fluid was present (though they could not explain its presence) an exploratory tapping was attempted with negative results. The temperature range was from 99 to 101° F. for three days and then the child completely recovered, as was shown in the films made six days after the onset of the acute illness. There was complete clearing of all physical signs in the chest (*Fig. 2*).

This undoubtedly is a clear case of massive atelectasis of the left lung in an infant four days old who was born perfectly normal and has a family history of no bearing whatever on the case. The most probable explanation is that the main bronchus was blocked by a plug of mucus which was coughed up, after which the lung immediately became aerated again.

Case 2.—W. T. C. was commercial agent for a railroad. He was 42 years old. His employment kept him in an office. His wife and three children were living and well. One office mate left two months before Mr. C.'s illness on account of tuberculosis. Otherwise there was no contact with tuberculosis.

His childhood and past history were of no significance. He had been a heavy cigarette smoker (30 a day) for twenty-five years. He was feeling perfectly well until June 4, 1927, when he developed a dry cough.

Physical examination, x-ray examination (*Fig. 3*), and sputum were all negative. Five weeks later (July 10, 1927) he had a small pulmonary hemorrhage. He went to bed, but three weeks later had two small hemorrhages. He was then having an afternoon temperature of 99 4/5° F. There was some cough and expectoration, though with little pus in it. He had dyspnea on exertion only. He was kept in bed another three or four weeks, then sent to Asheville September 29, 1927, with suspected tuberculosis. He was spitting a slightly blood-tinged sputum which rapidly cleared, but ran a temperature from 98 to 100° F. daily, with only slight, if any, amelioration of his cough. Eighteen days later he was strong enough to come to the office for examination, at which time the essential findings were as follows:

He was a tall, slender, poorly nourished man of 42. His height was 70 inches, weight 123 pounds. He was pale, but not cachectic, anxious and worried. The fingers showed some clubbing with considerable curving and linear riding of the nails. The chest was long, narrow and thin, with right shoulder droop and marked limitation of expansion of the right side. Vocal fremitus and resonance were slightly increased over the right upper lobe, diminished and absent below on this side. The apex of the heart was in the fourth interspace three inches to the right of the mid-sternum. Its action was rapid, regular, and there were no murmurs. The blood pressure was 90-70. Percussion showed dullness over the right upper lobe, soon merging into flatness from the third rib down anteriorly and posteriorly, the left being clear. Auscultation showed tracheal breath sounds over the right upper lobe, absent breath sounds elsewhere on the right, exaggerated inspiration over the entire left lung, and no adventitious sounds anywhere.

Films show as in the slide. Urinalysis and sputum examination were negative. Blood hemoglobin was 70 per cent; red blood cells were 3,840,000, white blood

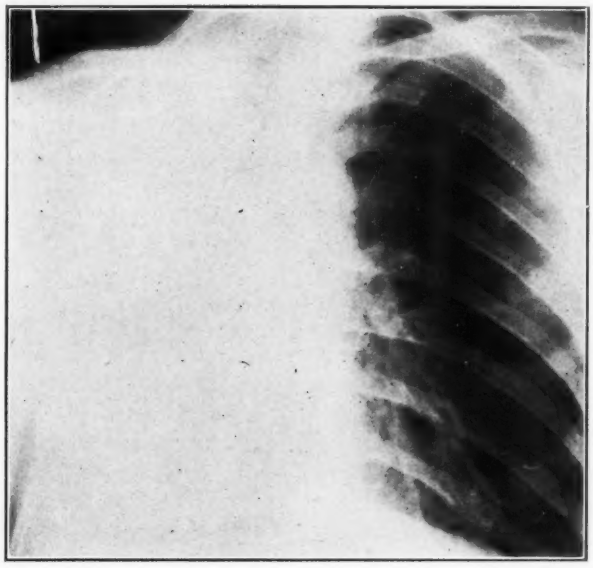

Fig. 4
W. T. C. October 18, 1927. Complete opacity of right chest with heart and trachea pulled to right side of thorax.

cells 9,140, differential was uninforming, and Wassermann negative.

You will note in the film of July 12 (*Fig. 3*) that we have an essentially normal chest picture. The roentgenologist, Dr. John H. Edmonson, who made the films, reported as follows:

"Chest, right side: some increased fibrosis is noted in the hilum, which contains a number of calcifications in its upper portion. Left side: hilus, bronchioles and parenchyma present nothing from an x-ray standpoint suggestive of disease. The heart is centrally placed and about normal in size. There is no impairment to diaphragmatic excursion. The films do not present the appearance of a tuberculous manifestation."

When he was sent to Asheville it was hoped that the patient was suffering from some form of "atypical tuberculous pleurisy," though the transmitting physician had had no opportunity for examination of the patient, owing to the continuing hemoptysis. Here is a patient, then, of 42, an inveterate smoker of cigarettes for twenty-five years, 46 pounds under weight, though only 10 to 15 pounds under his own personal average. He presents the history of a harassing cough which developed without a coincident respiratory infection. This cough was at first dry with later some muco-purulent expectoration and repeated hemoptysis with daily temperature to 99.5 or 100° F.

As you note, x-ray films made prior to any blood spitting, but because of suspected tuberculosis, revealed an essentially normal picture, with the heart in its proper position.

Some ten weeks after the hemoptysis, when I saw the patient, the entire picture was changed, but it was not at first apparent what was the true condition. For two weeks after arrival in the sanatorium the patient was not subjected to thorough chest examination for fear of causing a return of the hemoptysis. The blood picture had immediately cast suspicion upon the probability that this was a case of pulmonary tuberculosis. Such a degree of anemia as 3,800,000 red blood cells in a patient who showed no demonstrable tuberculous condition only three months previously and who had not lost, all told, in two months over a pint of blood, did not lend weight to the possibility of tuberculosis.

The patient was brought to the office because of a suspicion that a more serious state of affairs was going on than tuberculosis. The clubbing of the fingers seemed to be increasing, the temperature showed no change under bed rest on a sleeping porch, he had been told that it was not proven that he had tuberculosis, that all sputum tests had been proven negative, and the risk of further hemorrhage was thought to be small. The films showed, as you see (*Fig. 4*), a complete dextrocardia (of a heart three months previously in normal position), a trachea pulled well to the right, and uniform massive density of the entire right chest. With the physical findings as outlined earlier, it was now apparent that we were dealing with a case of complete atelectasis of the right lung. The cause of this was difficult to ascertain. Pulmonary hemorrhage from tuberculosis with organization of a clot resulting in plugging the main stem bronchus, did not seem likely, particularly as there was no evidence of tuberculosis. The general appearance of the patient, the rapid clubbing of the fingers, especially the anemia out of proportion to probable tuberculosis, the persisting afternoon daily temperature, and the failure of the patient to improve, caused the suspicion of malignancy. A tentative diagnosis, then, of endobronchial malignancy was made which seemed to explain the whole history from harassing dry cough with subsequent hemoptysis to the development of massive atelectasis, and bronchoscopic examination was urged. The patient was referred to Dr. Chevalier Jackson, of Philadelphia, who reported as follows:

"Mr. C. was referred to us with the opinion that he did not have pulmonary tuberculosis and also that the right lung was collapsed. Our bronchoscopic examination confirmed both of these opinions. As you will see by the enclosed report of bronchoscopy, the collapse was due to the fact that the right bronchus was plugged with a white pedunculated tumor which had the appearance of being malignant. A specimen taken bronchoscopically confirmed this tentative bronchoscopic diagnosis. Dr. B. L. Crawford, who examined the specimen histologically, reported the growth to be carcinoma. As the growth is at the root of the lung in the main bronchus, external surgery is not indicated. I could easily remove the mass of the growth with biting forceps, but mutilation of a cancer does not seem to be good surgery, and especially so in this

case, because carcinoma of the lung is particularly susceptible to arrest by deep roentgen therapy."

Pathological Report.—"The specimen consists of several small shreds of grayish tissue, the largest measuring 7 mm. in its greatest dimension. Sections show the fragments of tissue to be largely composed of masses of large cells with hyperchromatic nuclei. The cells vary greatly in size and shape, are undifferentiated and many show mitosis. There are small fragments of necrotic tissue present and only a very small piece of stratified squamous epithelial mucosa is attached to one of the fragments of tissue. There is no question that the lesion is a malignant neoplasm, and the cells are considered to be epithelial, but they are not sufficiently differentiated to indicate the type of epithelium from which they are arising. The diagnosis is carcinoma."

The patient returned to his home in Birmingham for deep x-ray therapy. This failed to accomplish anything save the alleviation to some extent of the dyspnea, which undoubtedly must have become progressive. He died April 14, 1928. A summary of the pathologist's report by Dr. George S. Graham is as follows:

"Anatomical Diagnosis.—(1) Carcinoma of the right bronchus, with metastasis into liver, spleen, pancreas, cecum and in bronchial mesenteric, para-aortic lymph nodes.

"(2) Atelectasis of right lung.

"(3) Chronic adhesive pericarditis.

"(4) Chronic adhesive pleuritis.

"(5) Pleural effusion (right).

"(6) Post-mortem or agonal intussusception of the ileum.

"The histology of this tumor indicates origin from the bronchial mucous membrane."

The mechanism of the atelectasis in this case is quite apparent. A malignant growth starting in the main right bronchus produces a harassing cough, followed by hemoptysis as the tumor ulcerates. The hemoptysis is repeated and finally either a clot organizes or the tumor growth reaches sufficient size to block the main stem bronchus. Coincident with the general symptoms of progressing malignancy, the air in the right lung is fairly rapidly absorbed because of the blocked bronchus and the picture of massive atelectasis is found. Bronchoscopic, pathologic and autopsy examinations confirm the diagnosis.

ROENTGENOLOGICAL MANIFESTATIONS OF PEPTIC ULCER*

By J. P. CHAPMAN, M.D.,
Birmingham, Ala.

The remarkable advances made in the diagnosis of abdominal diseases during the past two decades have been due to the development of the roentgen ray more than to any other method of investigation. The contrast meal at the present time is regarded as the most dependable method of recognizing ulcers of the stomach and duodenum, and in its high degree of efficiency has brought into bold relief the inadequacy of former methods. In the light of this modern investigation it has been necessary in some instances to revise our conception of peptic ulcers and to discard much of the older statistical studies of the pre-roentgen ray period.

Experience has shown that it is often desirable to make a flat plate of the abdomen preliminary to a gastro-intestinal series. Abnormality of the spine, calculi of the gall bladder or urinary tract, or other conditions may be found that could not have been recognized after beginning the opaque meal. During the fluoroscopic examination, as the patient drinks the barium sulphate mixture, the outlines of the stomach and duodenum are carefully studied. Any irregularity of the margins, spastic contractions, changes in the lumen, irregularities of the motor mechanism, variations in the emptying time and tender points are noted. Ordinarily the variations may be easily recognized by a careful observer who understands the appearance of the normal stomach and duodenum, though at times some difficulty may be experienced.

THE SIGNS OF GASTRIC ULCER

The evidence of gastric ulcer is very definite. Many important indirect signs have been described and should be carefully noted, but are of

*Read in Section on Gastro-Enterology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Fig. 1
Hour-glass stomach, with large filling defect, suggestive of malignancy, but due to an ulcer perforating posteriorly and producing extensive organic changes.

less significance than the so-called direct signs. A protuberance or marginal projection from the lesser curvature of the stomach, which Haudeck originally designated as a "niche," represents the barium-filled crater of a gastric ulcer, and has become the most important x-ray sign of ulcer of the stomach. An accessory pocket or cavity near the lesser curvature, produced by a perforation of the ulcer with a walling off process, may be easily demonstrated, unless a mucous plug happens to block the sinus tract into the cavity at that particular period. These are the classical signs of ulcer and when present can be readily interpreted, but unfortunately the recognition of gastric ulcer is not so easy as this would indicate.

Ulcers not occurring on or near the lesser curvature become more difficult to detect. At the Mayo Clinic[1] 14 per cent of gastric ulcers were found on the posterior wall, while others were near the cardia, in the pars media, pylorus or at the pyloric ring. In such cases the detection of ulcer requires special methods of study, such as have been described by the late Dr. Carman. One must carefully observe the opaque meal as it canalizes the stomach, watching the parallel lines of the sulci between the rugae to note any convergence or divergence of the lines at any particular point. If this area is tender and is associated with a small fleck of barium remaining in the gastric wall an ulcer of the stomach is usually present. Careful manipulation of the stomach after a few ounces of the barium mixture have been ingested, approximating the anterior and posterior walls, may reveal a small ulcer crater which cannot be seen if the stomach is filled before making the observation. Changing the position of the patient both standing and lying on the table, and taking films in the lateral and oblique views, may permit the demonstration of posterior gastric ulcer.

Certain indirect signs, however, at times become highly important. Pre-pyloric narrowing and tucking up of the antrum producing antral deformity has been emphasized by Moore[2] as suggestive of gastric ulcer. Intrinsic spasm, gastric retention, hour-glass contraction, and disturbance of the motor mechanism are conditions that require most careful differentiation from extra-gastric lesions. Under the physiological effect of belladonna such manifestations disappear as a rule if due to lesions elsewhere, but persist if arising from lesions within the stomach.

The roentgen ray may be of value in recognizing malignant changes in gastric ulcer. Though often difficult to determine, yet when the ulcer crater is widened, at times revealing the Carman's meniscus sign, and the margin becomes irregular, a carcinoma may have developed. Such signs, however, are sometimes misleading, as in a case recently studied.

In a patient fourteen years ago a saddle ulcer was found near the pylorus, producing an extensive filling defect in the pre-pyloric area. Peristalsis was interfered with and the tender area seemed fixed. The roentgenological opinion of a malignant engraft seemed justifiable. Operation was refused, but subsequent observations did not manifest extension of the process. Recently, on account of pyloric obstruction, a gastro-enterostomy was performed, and at the operation there was no evidence of malignancy, but the large filling defect was caused by induration from the ulcer and peri-gastric adhesions.

An hour-glass stomach is considered pathognomonic of gastric ulcer, though the possibility of malignancy and syphilis must be considered and all available clinical evidence must be utilized in distinguishing these conditions. It should be remembered, however, that ulcer may occur in a syphilitic patient. Functional hour-glass constrictions and other spastic manifestations of the stomach are often seen and always introduce a possible error in the diagnosis, as illustrated by the following two cases.

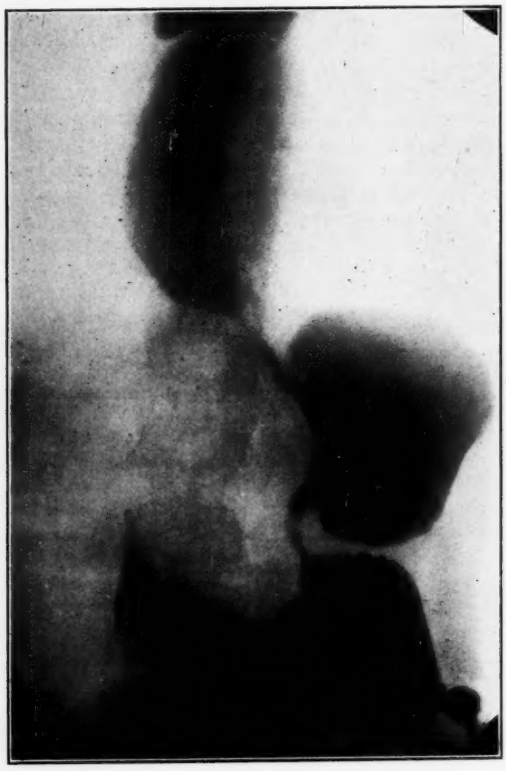

Fig. 2

Extreme gastrospasm of reflex origin. Esophageal diverticulum, mid-portion, dilated esophagus from cardiospasm, hour-glass spasm of stomach, produced by gall bladder disease and gall stones, and chronic appendicitis, confirmed at operation.

The x-ray examination of an aerophagic, nervous individual revealed a marked cardiospasm, with a large constricting ring in the stomach, dividing it into two unequal segments, presenting the "cascade type stomach." With gastric retention, tenderness and spasticity of the duodenal cap, a probable duodenal ulcer was diagnosed. Anti-spasmodic did not completely relax the spasm. The condition was proven at a subsequent operation not to be an ulcer, but a reflex spasm due to a diseased appendix.

In a second patient there was a cardiospasm with a greatly dilated esophagus, a right-sided esophageal diverticulum at mid-portion, and also a marked hour-glass narrowing in the middle of the stomach with a fine line of barium communicating the two lobes. The large duodenal bulb showed a pressure defect and the appendix was adherent and segmented. Belladonna only partially relaxed the gastrospasm, but no niche could be demonstrated. At laparotomy the stomach gave no evidence of ulcer, but a large diseased gall bladder filled with stones and a diseased adherent appendix were removed.

THE SIGNS OF DUODENAL ULCER

The recognition of duodenal ulcer is based upon a few signs as is that of gastric ulcer. The most significant sign is a persistent deformity of the duodenal cap, or bulbar deformity as originally described by Cole. This irregularity may assume bizarre shapes. The factors producing it are, first, the niche or ulcer crater, usually on the lesser curvature; and second, the superimposed functional spasticity. Permanent changes may be produced by the induration with a distorting scar or adhesions from peri-duodenitis. Belladonna, if given in physiological dosage, will often relax the duodenal spasm and permit the visualization of the ulcer crater. Diamond[3] has emphasized the importance of this method, reporting the crater visualization in 67 per cent of his series. Occasionally a diverticulum of the bulb may be found associated with the ulcer. This is not a true diverticulum, but is a flattening of the cap with a band of adhesions, producing a pouch on the greater curvature as shown in *Figure 4*. In other cases typical hour-glass constriction of the duodenal bulb may be seen, and it may persist even after complete symptomatic relief under medical treatment. Extreme spasm of the pylorus may sometimes be found, making it difficult to manipulate the barium mixture through the ring.

An x-ray film showing an irregular duodenal bulb is not sufficient evidence for diagnosis of duodenal ulcer. The irregularity must persist in a number of films and should be observed also during fluoroscopic examination in order to establish a definite bulbar deformity. Adequate filling of the bulb is essential to a proper recognition of disease, and incomplete filling is too often the cause of error in diagnosis. Manipulation is at times difficult, especially with patients who are nervous or have thick abdominal walls, and who hold the muscles very tense. A very tender abdomen is difficult to examine satisfactorily. Relaxation, however, may be secured through deep breathing, keeping the hand on the abdomen and maintaining uniform pressure while manipulating the stomach. Changing position and blocking the transverse duodenum with the left hand while manipulating with the right are procedures that facilitate filling of the cap in difficult cases. In the transverse type of stomach the duodenum is usually very difficult to visualize.

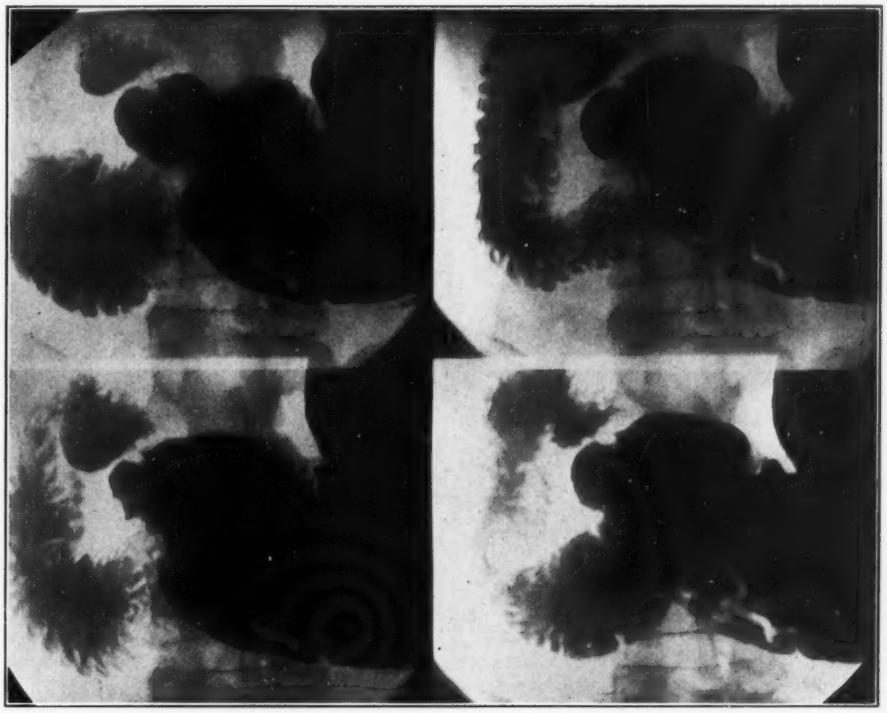

Fig. 3
Duodenal stasis with spastic phenomena, suggestive of duodenal ulcer, associated with diseased appendix. Anti-spasmodic therapy relieved the spasm, but not the stasis.

PYLORIC OBSTRUCTION

Gastric retention at the end of the six-hour period becomes significant from a diagnostic point of view. Ulcer of the stomach is more apt to cause retention than duodenal ulcer except in the obstructing stage of the latter. In an atonic stomach with deep peristaltic rings passing uniformly to the pylorus the obstructing lesion is usually a duodenal ulcer. It is necessary at times to distinguish between pylorospasm from duodenal ulcer and pyloric obstruction from annular carcinoma at the pyloric outlet. Carcinoma rarely completely blocks the pylorus and a small stream of barium may be seen passing through into the duodenum. There may be a much wider pyloric ring than normal in the presence of pyloric carcinoma. Belladonna will lessen gastric retention in ulcer, whereas in malignant obstruction it has no effect.

EXTRA-GASTRIC LESION

Many errors occur in the x-ray diagnosis of the duodenum. All deformities of the bulb are

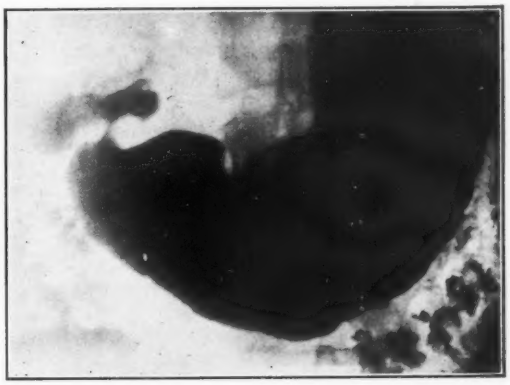

Fig. 4
Duodenal ulcer, lesser curvature, with fibrous changes resulting in diverticulum-like pouch on greater curvature.

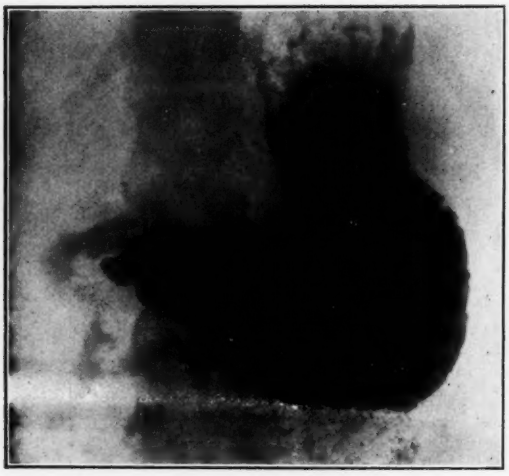

Fig. 5

Hour-glass deformity of duodenal bulb produced by inflammatory reaction from duodenal ulcer. The ulcer had healed, but the permanent deformity required surgical treatment.

not due to ulcer, for it is a well established fact that extra-gastric lesions can produce reflex spasm of the bulb. The close relation between the ileo-cecal and pyloric regions has been emphasized. The mimicry of duodenal ulcer by diseased appendix has been observed, and it would seem unnecessary to caution against the diagnosis of duodenal ulcer on insufficient grounds or through lack of thorough x-ray study. It must be remembered, however, that frequently a diseased gall bladder or appendix, or both, may be present with a duodenal ulcer. In a small series of ulcer patients who were operated upon the appendix was found diseased in 30 per cent and the gall bladder as well as the appendix had to be removed in 15 per cent of these cases. In all of these patients the multiple pathology was observed in the diagnostic survey. In view of the many possible errors of diagnosis, in a statistical study of peptic ulcers only those cases should be included that present the most exacting diagnostic evidence.

HEMATEMESIS

Hemorrhage from the stomach is usually considered an important evidence of peptic ulcer, but this is a great fallacy, since many other causes of hematemesis are known. In less than 25 per cent of Moynihan's[4] cases did it occur in ulcers of the stomach. The x-ray is the main dependence in determining the source of hemorrhage, and yet one is greatly disappointed by frequently not finding x-ray evidence of ulcer, even when an ulcer history is given. Hemorrhage seems to make healing easier, relieving the spasm for the time being.

The question arises, when is it safe to x-ray a patient after hemorrhage? It is certainly best to defer the examination for at least three or four weeks, since earlier examination may invite further hemorrhage. Under the most careful examination considerable pressure is exerted on the stomach by manipulation in trying to outline the stomach and duodenum. It is necessary to be very careful not only after hemorrhage, but also while the patient is having considerable epigastric pain, for such symptoms may indicate that the ulcer is on the verge of perforation. In one case, even with gentle manipulation, the duodenal ulcer perforated a short time after the first examination, and in all probability the manipulation contributed to the injury.

An example of error of diagnosis in gastric hemorrhage and incomplete x-ray examination came to our Clinic recently.

A man, 54 years of age, with variable history of indigestion, after a hemorrhage from the stomach was x-rayed and a peculiar irregularity of the pylorus was seen. The diagnosis of ulcer of the stomach was made and the patient sent to us for medical treatment.

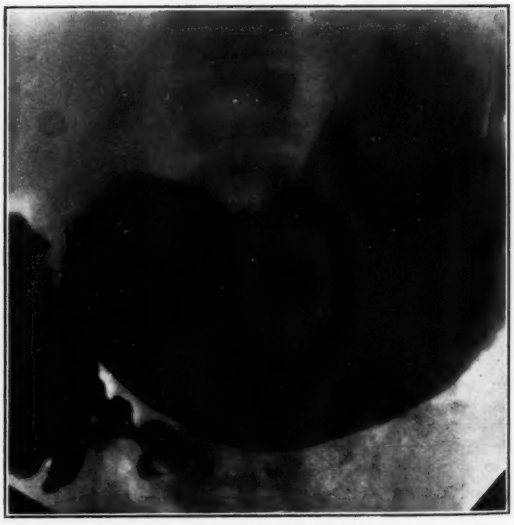

Fig. 6

Extremely atonic or dilated stomach, the end-result of prolonged pyloric obstruction from duodenal ulcer. Gastro-enterostomy gave relief of symptoms and restored gastric tone to normal condition.

Fig. 7

A post-operative study of patient with duodenal ulcer. Gastro-enterostomy functioning satisfactorily, with 25 per cent of barium meal leaving the pylorus. Three years after operation, the extensive bulbar deformity still present.

During the re-examination he was found to have a benign tumor of the stomach and was advised to have an operation, at which time a pedunculated adenopapilloma near the pyloric ring was removed and microscopic section showed malignant degeneration. This was the second member of the same family who had this condition.

POST-OPERATIVE X-RAY STUDY

The value of the x-ray is not limited to diagnosis of ulcer, but has proven its service in determining the extent of damage, the complications, the progress under medical or surgical treatment of ulcer, and also the end-results. In studying patients after surgery it is important to observe the stoma, its function, the presence of spastic areas, whether the pylorus is patent, and the emptying time of the stomach. A gastric retention after six hours, dilatation, hyperperistalsis, or non-functioning stoma are suggestive of obstruction or adhesions. The presence of a gastro-jejunal ulcer is indicated by spastic state of the stoma with interference of emptying time. In a series of 20 cases operated upon, two pyloroplasties were unsatisfactory, one marginal ulcer appeared, and the other seventeen gastro-enterostomies have apparently given the patients complete relief.

X-RAY SIGNS OF HEALED ULCER

It is often desirable to determine if possible when an ulcer is healed and the roentgenologist is asked for his opinion. A period of remission of symptoms is not a safe criterion of cure, though when associated with certain roentgenological signs it is important. Many reports tend to show that during the healing of the ulcer there is a smoothing out of the niche and in some cases restoration of the normal gastric contour takes place, though a year or two may be required. Superficial erosions or shallow ulcers heal more readily, leaving a smooth outline; but a deep, perforated ulcer produces considerable inflammatory reaction and scarring, with distortion or construction, and is nearly always a permanent deformity. In the process of healing, the spasm disappears, there is no local tenderness, and from the x-ray signs alone it may not be easy to say when the ulcer has healed. Examination should be made periodically for several years. A patient recently examined showed an irregular duodenal bulb, without local tenderness or interference with gastric motility, who had been free from ulcer symptoms for ten years after medical treatment. Sometimes after a gastro-enterostomy for duodenal ulcer the irregular bulb may be observed several years afterwards.

In conclusion, we may state that the roentgenological examination appears to have reached its highest efficiency in accuracy and diagnosis of gastric and duodenal ulcers, and that no study is complete without its evidence of disease. Many errors of diagnosis are made, but they are usually the result of incomplete and insufficient study, sometimes from inexperienced observers. Spastic manifestations from extra-gastric lesions are misleading and require careful differentiation by the use of anti-spasmodics. The x-ray examination of the stomach is not without danger, from lack of gentleness of manipulation or too early examination after gastric hemorrhage. Especially in patients having considerable epigastric pain the possibility of perforation of ulcer should be kept in mind in order to avoid further damage to the stomach by the examination. Post-operative study gives information as to functional results. The progress of medical treatment and the end-results may be followed by periodic x-ray observation. Associated pathological lesions should be carefully looked for in making the x-ray diagnosis of ulcer, and the finding of such a diseased condition is a large factor in the successful treatment and relief of symptoms of the patient.

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DISCUSSION (*Abstract*)

Dr. Seale Harris, Birmingham, Ala.—The x-ray is the most important method for diagnosing gastric and duodenal ulcer and often it is all that is necessary for the diagnosis. A negative report of the roentgenologist is often quite as important as a positive report in the diagnosis of ulcer.

The large mulberry type of gallstones will often give the identical symptoms of duodenal ulcer; pain two or three hours after eating, relieved by taking food or by soda, but the x-ray examination will show the true condition.

Probably 10 per cent of the cases of duodenal ulcer do not show x-ray evidence of it and the diagnosis has to be made from the clinical history and treatment by feeding and rest.

It is not easy to learn the technic of these examinations and in this country there are many men who are using the x-ray without much experience. The value of their findings is in direct proportion to their ability to interpret the plates. It is highly important that the roentgenologist be a physician and that he have the opportunity, as Dr. Chapman has had, to study the patient clinically, to make a physical examination, and study the laboratory findings.

Both the fluoroscopic examination and the plate are of great value but unquestionably the fluoroscopic examination is more important. It is desirable always to have plates made to record the findings but the fluoroscopic study gives more information than even a considerable series of plates, in the average case. It is oftentimes necessary to study the patient in various ways and positions to bring out the filling defects.

Dr. George M. Niles, Atlanta, Ga.—In regard to the roentgen ray diagnosis of gastric or duodenal ulcer, the point has been properly stressed that much depends upon the care and ability with which the examination is made. Our enterprising x-ray manufacturers have almost equalled the automobile output, getting outfits nearly everywhere. I am in an office building in Atlanta and there are about twenty x-ray outfits in that building. A salesman told me the other day that he was going to sell a physician an x-ray outfit on a payment of $35.00 a month. Now when you put a diagnostic agent like the roentgen ray in the hands of a busy general practitioner, and have roentgen studies made by an inexperienced technician, the findings cannot be of so much value as if they were made by one who has had experience and is able to correlate his observations.

Dr. Lewis G. Cole sometimes in a doubtful case will make from 75 to 100 plates. If he finds a lesion that persists in 75-80 per cent of the plates he feels that it amounts to something.

In a stomach that is irritated with an ulcer the picture must be gotten quickly. Sometimes a peristaltic wave will show and the next time it does not show, but you must show it uniformly. I take as many films as I can. Sometimes this is limited by the patient's ability to pay or by the time available.

Dr. Julius Friedenwald, Baltimore, Md.—Dr. Baetjer and I, in 1912, pointed out the great value of the x-ray in determining the healing of ulcers. Often a patient will undergo ulcer treatment and will be apparently very much benefited but in the course of five or six weeks identically the same x-ray picture will be obtained that was observed at first. If such a case, however, is re-examined from time to time, that is in from six months to a year, healing will probably be noted. I believe that we have here a method to determine definitely whether healing of the ulcer has taken place or not, a very important factor in drawing conclusions as to whether our treatment has been effective.

Dr. F. M. Durham, Columbia, S. C.—So many things can produce a temporary spasm or deformity of the gastro-intestinal tract that the roentgenologist must necessarily be well-versed in gastro-enterology. A hypertrophied anal papilla, a rectal polyp, a spasmodic sphincter ani, a fissure *in ano* may and often do have a bearing on the whole digestive tract.

It is well if you are not positively satisfied with your diagnosis after making use of the fluoroscope and x-ray, to look for small rectal and anal lesions through the proctoscope.

Dr. A. B. Moore, Rochester, Minn.—There is no question as to the great value of the roentgen examination in diseases of the gastro-intestinal tract. It should be stressed that the roentgenologic findings constitute but one link in the chain of diagnostic evidence. Correct diagnoses can be arrived at only by collaboration. In our experience we have found it more satisfactory for the roentgenologist to have little or no knowledge of the clinical diagnosis until his examination is completed.

I understood Dr. Chapman to say that he had seen anti-spasmodics produce a change in the deformity caused by duodenal ulcer. This is contrary to my experience. I wonder if the apparent change was produced by more perfect relaxation at the second examination. Unquestionably, duodenal deformities can be produced and accentuated by rigidity of the abdominal muscles. Perfect muscular relaxation is one of the essentials in a satisfactory roentgenologic examination.

It seems to me that we see fewer obstructing duodenal ulcers than we formerly did. It is rather unusual to see the marked retentions that were common in the earlier days. A barium retention at the end of six hours is, of course, not pathognomonic of an intrinsic lesion. It is only an indication to search carefully for a lesion. Not uncommonly migraine, dread of the examination, and other nervous elements will cause a fairly large retention in the stomach. The presence of a six-hour retention is, of course, of little value unless a motor meal of standard quantity and weight is given and the patient takes no other food until the examination is made.

Dr. A. L. Levin, New Orleans, La.—I should like to ask one question of Dr. Chapman and Dr. Moore. Do you ask the patient to swallow the whole glass of barium at one time and cover the whole area or ask him to take a few sips? At a recent meeting one of

our leading radiologists emphasized the importance of giving a small quantity of barium at first because you often have an ulcer on the posterior wall or near the pylorus and if a large quantity is swallowed it is all covered up, but if a small quantity is given you can trace the barium better into the crater of the ulcer and are not liable to overlook it.

Dr. Chapman (closing).—Reference was made in my paper to the importance of fluoroscoping the patient during the ingestion of the barium mixture. One must look for any irregularity of outline, fleck of barium on the posterior wall, or niche which may be easily seen as the lumen is being canalized, but which may be obscured after the stomach is completely filled. This assists in the detection of gastric ulcers that otherwise would be overlooked. The value of the x-ray in following the healing process during the treatment of ulcer, and in observing the functional results after surgical procedures, becomes apparent with its more general use.

DIAGNOSIS AND TREATMENT OF DISEASES OF THE GALL BLADDER*†

By BARNEY BROOKS, M.D.,
Nashville, Tenn.

The discovery of a new method of examination in clinical medicine is always attended with an increase in interest in the particular condition to which this method of examination is applicable. The institution of the method known as cholecystography by Graham, Copher and Cole has resulted in an increased interest in diseases of the gall bladder. It may happen that this increase of interest in a particular condition results in the ascribing of more value to the method than it in reality deserves. The true value of a method of examination is only definitely determined by a critical analysis of the results in reality accomplished after a considerable period of its use.

The object of this paper is the report of a study of one hundred consecutive instances in which careful records have been kept and these records carefully reviewed. In all instances included in this report, the patients have been in the wards of the Vanderbilt University Hospital. The clinical records, the pathological specimens and the roentgenograms were all available for critical review.

METHOD OF STUDY

The records of the clinical conditions, the cholecystographic examinations and the pathological specimens were separately assembled and studied independently.

The clinical records were particularly well suited to the formation of an unbiased opinion. Every record contained notes concerning the history and physical findings by more than one observer. In most instances a record of the individual's clinical history and physical findings had been recorded by individuals ranging in experience all the way from medical students through intern, assistant resident, resident, to an experienced visiting surgeon. In the reviewing of these clinical records, they were divided into two groups. In one group were placed all instances in which the history and physical findings corresponded with the classic clinical picture of gall bladder disease. It is not necessary to go into details as to what constitutes the clinical picture which every one would admit is indicative of gall bladder disease. It may be stated, however, that the history of repeated attacks of gall bladder colic or the unmistakable physical finding of an enlarged tender gall bladder, for the most part, constituted the criterion of determining the group of patients having the typical clinical picture of disease of the gall bladder. All instances, in which the history or physical findings did not fit into the generally accepted typical clinical condition were classified as atypical. It may be briefly stated that this group was constituted, for the most part, of patients with chronic indigestion associated with soreness under the right costal margin or patients having the first attack without unmistakable physical findings indicative of disease of the gall bladder.

All the records of the cholecystographic examinations were reviewed. In all instances tetraiodophenolphthalein was given intravenously following exactly the technic recommended by Graham, Copher and Cole. All patients had roentgenograms at four, eight, twelve and twenty-four hours after the intravenous administration of the drug. In the examination of the roentgenograms, the time of the appearance and disappearance of the shadow, as well as the time at which the greatest concentration was shown, were observed. There was in no instance any difference of opinion by independent observers as to the presence or absence of a shadow of the gall bladder. In the final analysis of the roentgenogram, the time of appearance or disappearance of the shadow was not taken into consideration. The cholecystographic examinations were divided into three groups. One group was constituted by those in which no shadow of

*Read in Section on Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the Department of Surgery, Vanderbilt University Medical School, Nashville.

the gall bladder appeared or in which there was unmistakable evidence of the presence of gall stones which appeared either as positive or negative shadows; a second group contained all instances in which only a very faint shadow of the gall bladder appeared; and the third group, all instances in which a good shadow of the gall bladder appeared regardless of the time elapsing between the intravenous administration of the drug and the appearance of the gall bladder shadow. Our experience does not justify a discussion of the value of the methods of testing the capacity of the gall bladder for emptying its contents.

The pathological material was studied in gross and microscopically. Three instances are included in this study in which the gall bladder was carefully examined at operation for other conditions in the abdomen than disease of the gall bladder. In each of these instances there was no indication of gall bladder disease. In all other instances the exact condition of the gall bladder was determined from the material in the surgical pathological laboratory. After the gross and microscopic study of the material in the surgical pathological laboratory, it was divided into three groups according to the degree of pathologic change found. All instances in which the pathological changes were of such a degree as to produce marked gross changes in the gall bladder wall or instances in which gall stones were present were classified as marked pathological change. All instances in which there was only slight gross thickening of the gall bladder wall, but which showed unmistakable evidences on microscopical examination of chronic inflammatory disease, were classified as slight pathological changes. All other instances, in which there was not unmistakable gross or microscopical change in the gall bladder wall, were classified as indefinite pathological changes. It may be stated, however, that in some of these instances adhesions between the gall bladder and near-by intraperitoneal structures were described in the operator's note of the findings at the time of operation.

The results of this study are shown in *Tables 1, 2, 3* and *4*.

TABLES 1 AND 2

	Cases	Marked Pathological Change	Slight Pathological Change	Indefinite Pathological Change
Clinical picture typical	49	41-84%	5-10%	3-6%
Clinical picture atypical	51	27-53%	20-39%	4-8%
Total	100	68	25	7
Cholecystography, no shadow	33	29-88%	3- 9%	1- 3%
Cholecystography, faint shadow	21	6-29%	13-62%	2- 9%
Cholecystography, good shadow	6	*1-17%	2-33%	3-50%
Total	60	36	18	6

*Patient had previous cholecystostomy.

TABLE 3

	Cases	Marked Pathological Change	Slight Pathological Change	Indefinite Pathological Change
Clinical condition typical, no cholecystography	26	24-92%	1- 4%	1-4%
Clinical condition atypical, no cholecystography	14	8-57%	6-43%	0-0%
Total	40	32	7	1

TABLE 4

	Cases	Marked Pathological Change	Slight Pathological Change	Indefinite Pathological Change
Clinical condition atypical, cholecystography good shadow	6	*1-17%	2-33%	3-50%
Clinical condition typical, cholecystography good shadow	0	0- 0%	0- 0%	0- 0%
Clinical condition atypical, cholecystography faint shadow	14	5-36%	9-64%	0- 0%
Clinical condition typical, cholecystography faint shadow	7	1-14%	4-57%	2-29%
Clinical condition atypical, cholecystography no shadow	17	13-76%	3-18%	1- 6%
Clinical condition typical, cholecystography no shadow	16	16-100%	0- 0%	0- 0%
Total	60	36	18	6

*Patient had previous cholecystostomy.

DISCUSSION

It is clear that this study was only for the purpose of determining the value of cholecystography as a method of estimating the degree of anatomic pathologic change in the gall bladder.

From an examination of *Tables 1* and *2* it is interesting how nearly the arbitrarily chosen degrees of pathological change in the gall bladder corresponded, if estimated before operation, either by the purely clinical method of study or only by the results of cholecystographic examination. When it is considered, however, that *Table 1* includes all instances in which the history and physical findings made the presence of disease of the gall bladder so obvious that cholecystographic examination was not undertaken previous to operation, it is clear that the relative accuracy of the cholecystographic examination should be greater than is indicated by the figures.

In *Table 3* are the results of the study of the records and the pathological specimens of those instances in which operation upon the gall bladder was undertaken without cholecystographic examination. This group of patients were, of course, made up of those instances in which the operator considered the purely clinical examination to be sufficiently reliable to justify the undertaking of an operative procedure without cholecystography. A critical review of these clinical records would indicate that in most of these instances the operator was correct in the position taken. This table is included in this report only for the purpose of showing the relative degrees of pathological change found in operations upon the gall bladder without previous cholecystographic examination.

In *Table 4* are shown the results of the pathological examination in sixty instances in which the cholecystographic examination and the clinical picture are known. From an examination of this table, it is important to note that in only one instance marked pathological change occurred in a gall bladder which had, previous to operation, shown a good shadow by cholecystographic examination. In this particular instance the patient had had a previous cholecystostomy and it is not unlikely that the pathological changes found in the gall bladder were the result of the previous operative procedure. In the three instances in which it was possible to examine the gall bladder under the conditions of an atypical clinical picture and a good cholecystographic shadow, two patients were operated upon for other intra-abdominal conditions and one patient was considered by the operator to have sufficient clinical evidence of gall bladder disease to justify a laparotomy. Although the gall bladder appeared normal on the operating table, it was excised on account of a confusion of the meaning of the words "positive" and "negative" in the written report of the cholecystographic examination. It is also interesting to call attention to the fact that every patient having clinical findings strongly suggestive of gall bladder disease, at the same time showing no shadow on cholecystographic examination, showed marked pathological change in the gall bladder. It is also worth while calling attention to the fact that gallstones were present in 21 of the 60 cases having cholecystography previous to operation. In every patient in which gallstones were found at operation, cholecystographic examination showed either no shadow or unmistakable positive or negative gallstone shadows. It is also worth while to point out that no patient with a characteristic clinical history of gall bladder disease showed on cholecystographic examination a good shadow of the gall bladder.

From this study it is clear that cholecystographic examination makes it possible to estimate with a high degree of accuracy the anatomic pathologic changes in the gall bladder. The relationship between the degree of anatomic pathologic change in a gall bladder and the indication for cholecystectomy is a problem which might be discussed for a period of time exceeding that available for the presentation of this paper. The indication for cholecystectomy in instances in which the gall bladder is the seat of marked gross anatomic pathologic change is sufficiently clear to need no discussion. The excision of the gall bladder which shows little or no definite anatomic change is in the light of the meager knowledge existent of the function of the gall bladder a doubtful procedure. If the fact that there was little pathological change in the gall bladder were known previous to operation, then the wisdom of advising a cholecystectomy would have been even more open to question.

The gall bladder can hardly be considered a useless organ like the appendix. Of course, the excision of a gall bladder showing little pathological change may save the patient the ill effects of the further development of the disease. The gall bladder showing marked pathological changes must have had, at some previous time, a beginning. If a patient's abdomen is already

TABLE 5

PRE-OPERATIVE CONDITIONS	Cases	Operations	No Operations	Operations Advised and Refused	No Operation Advised
Typical history	115	52	63	28	35
Atypical history	167	41	126	12	114
Cholecystogram positive	99	35	64	23	41
Cholecystogram doubtful	54	21	33	7	26
Cholecystogram negative	61	0	61	1	57
Typical history, no cholecystogram	38	26	12	7	5
Atypical history, no cholecystogram	34	13	21	0	21
Atypical history, cholecystogram negative	46	0	46	0	43
Typical history, cholecystogram negative	14	0	14	1	13
Atypical history, cholecystogram doubtful	36	13	23	3	20
Typical history, cholecystogram doubtful	18	7	11	4	7
Atypical history, cholecystogram positive	55	17	38	9	29
Typical history, cholecystogram positive	44	18	26	15	11

open, this argument for cholecystectomy is certainly of more weight, but I hardly believe any one would justify a laparotomy for a prophylactic cholecystectomy.

In conclusion, it may be said that the Graham method of examination has put in the hands of the surgeon a very valuable method of determining, before operation, the anatomical pathological changes in the gall bladder. It is our belief that in the present state of knowledge of the function of the gall bladder the only sound basis for recommending laparotomy for cholecystectomy is the evidence for anatomic pathologic change in the gall bladder. This method of examination brings a long step nearer the abolishment of the "exploratory laparotomy" which must be the goal of every one doing abdominal surgery.

The influence of cholecystographic examination on the recommendation of operation for patients presenting the clinical evidences of disease of the gall bladder is shown in *Table 5*. It will be noted that there has been a relatively large proportion of instances in which operation has not been advised on the basis of the findings of cholecystographic examination. Perhaps the most important future study of the value of cholecystography will lie in further observation of instances in which the clinical findings have indicated gall bladder disease, cholecystographic examination has shown a good x-ray shadow of the gall bladder, and the patients have not been subjected to cholecystectomy.

Discussion follows paper of Dr. Long, page 239.

TRAUMATIC RUPTURE OF THE BILE DUCTS*

By LeRoy Long, M.D., F.A.C.S.,
Oklahoma City, Okla.

In this communication we shall discuss only injuries of the bile ducts produced by the external application of force. Trauma associated with surgical operations will not be considered. Our interest in the subject was recently stimulated by the study of the problems presented in a case of traumatic rupture of the hepatic duct, the particulars of which we shall now relate.

CASE REPORT

Miss Emma B., white, 40 years of age, slender, weight 130 pounds, whose previous health was good, entered University Hospital, Oklahoma City, March 22, 1928. She had a greatly distended abdomen, slight jaundice and weakness, following injuries received in an automobile accident March 3, 1928, about nineteen days before, when the right upper abdomen and extreme lower right chest were crushed between two automobiles. She received at the same time fractures of the right scapula and the right patella. She fainted while she was being held between the two cars, but was unconscious for only a few minutes. There was pain in the right upper abdomen, and pronounced shock.

Three days after the injury the stools were grayish white and the sclerae were stained a little, but by that time acute abdominal distress had disappeared.

There was comparative comfort for five or six days when, nine days after the injury, it was noticed that the abdomen was enlarged and the enlargement progressively increased. The jaundice became a little more pronounced, the appetite poor, and there was increasing weakness. There was no nausea. After the first three days the bowels had moved freely.

*Read in Section on Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

On her admission nineteen days after the injury, the abdomen was greatly and uniformly distended. The percussion note was flat throughout. There was but little tenderness. There was complaint of fatigue and annoyance because the distended abdomen interfered with the respiratory movements. There was a little yellowness of the sclerae. The skin was sallow, possibly a little yellow. The pulse was 110, blood pressure 110 systolic, and 75 diastolic.

The next day after admission, abdominal paracentesis recovered 4,500 c. c. of fluid having the physical properties of thin bile. It had a specific gravity of 1.013, heavy blood (microscopic only), 40 white blood cells to the cubic mm. with 60 per cent neutrophils and 40 per cent lymphocytes. After thirty-six hours a culture was sterile.

The van den Bergh, direct, was 20, red blood cells were 3,820,000; white blood cells, 12,000, with 76 per cent neutrophils, small lymphocytes 8 per cent, large lymphocytes 12 per cent, transitionals 4 per cent. The next day there were 9,000 white blood cells with 70 per cent neutrophils, 26 large lymphocytes and 4 large mononuclears.

The urine was brown, cloudy, acid, specific gravity 1.024. It had a moderate amount of albumin, no red blood cells, a few white blood cells, no casts, moderate indican, heavy bile and many calcium oxalate crystals.

The feces showed fat. They did not show mucus, blood or bile.

She was observed from March 22 to March 26. The pulse was from 104 to 120, temperature 98.8 to 100°, respirations were 20 to 28, blood pressure around 110 systolic and 75 diastolic.

We concluded that there was bile in the peritoneal cavity as a consequence of a rupture of some part of the biliary tract, and an exploratory operation was advised.

The patient was operated upon March 26, 1928, four days after admission to the Hospital, three days after the parencentesis, twenty-three days after injury, through a six-inch right upper rectus incision, and under local novocain and general nitrous oxid and oxygen anesthesia.

There was a large amount, probably more than a gallon, of bile in the abdomen. All the viscera, with the exception of the gall bladder, were of a dark mahogany color. The gall bladder was thick and relatively very pale. The contrast between the color of the gall bladder and the other viscera was most striking. Here and there were soft adhesions between omentum and viscera, between the viscera, and extending from omentum and viscera to parietes.

The bile was removed by aspiration and sponging. After careful search, a wound of the hepatic duct near its junction with the liver was found. Whether the duct was entirely divided was not determined at the moment, because it was not deemed wise to carry out the dissection necessary to determine it.

In order to come to a fair conclusion as to whether the rupture involved the hepatic duct proper, or one of its radicles, the gall bladder was opened. There was no bile in it, not even a drop. The cystic duct was patent. Believing that if bile entered the common duct some of it would enter the gall bladder, we concluded that none was entering the duct distal to the rupture and, therefore, that the rupture was of the duct proper, and probably complete.

The site of the rupture made it impossible to repair the duct, certainly not without long, tedious and extensive dissection and operative trauma that the patient would not be able to bear. A small drainage tube was sutured to the tissues about the rupture. A large rubber tube was fixed into the gall bladder. Two sheets of rubber dam were tucked under and about the viscera beneath the gall bladder and then brought out through the operative wound in the abdominal wall.

The reason for placing the drainage tube down to the point of rupture and the rubber dam in the abdomen is obvious. It was for drainage, with the hope that the dam might at the same time limit the extravasation of bile; but the reason for fixing the tube into the gall bladder may not be so clear. This was done for three definite purposes:

First, to permit the escape of mucus and serum from the bile tract area, increasing the size of the lumen of the ducts by relieving the congestion and thickening of the mucosa, thus making it easier for the bile to enter and flow through the common duct.

Second, to relieve intra-ductal pressure, so that there might be an easy and quick escape of bile if it should enter the common duct.

Third, to help in determining, during the post-operative period, whether bile was entering the common duct below the point of rupture, it being obvious that if bile flowed out of the tube in the gall bladder this would be an indication that it was reaching the common duct.

The operation required seventy-two minutes and at the end of it, notwithstanding that practically no blood had been lost, there was a pulse of 140 and other evidences of shock. However, after the administration of normal salt solution under the skin and some glucose solution intravenously, there was a quick and satisfactory reaction.

The post-operative course was scarcely different from that observed after the average abdominal operation. In some respects it was better. There was no vomiting at any time. There was not much complaint of pain. Morphin 1/6 grain was given hypodermatically about twice a day for four days, mostly for restlessness. The patient slept much of the time and after the first two days was optimistic.

The record shows that there was a large amount of drainage (bile) until April 2, seven days after operation, after which there was gradual decrease with intermittent free drainage.

On March 29, three days after operation, bile was observed coming from the tube in the gall bladder. From that moment we were greatly encouraged.

At no time was there post-operative abdominal distention of importance.

An enema of one pint of warm water was given on the fourth day after operation. The nurse's note shows that there were a few small, whitish fecal masses in a cloudy fluid. On April 3, the nurse described the return after a small warm water enema as "greenish fluid with light yellow feces." The presence of bile in the feces was proven in the laboratory.

The two pieces of rubber dam were removed on April 9 and the tube in the gall bladder on April 11. On April 18 there is a note by the house officer: "No drainage from abdomen."

The patient was in a wheel chair at her pleasure, being restricted to the chair only on account of the fracture of the patella. She was discharged in good condition May 3. Since then she has been entirely well.

She was last seen in September, 1928, and at that time presented a picture of good health.

But few cases of traumatic rupture of the bile ducts are reported in the literature. Wallace and Spiro,[1] reporting a fatal case in 1926, could find a record of only fifteen during the previous twenty-five years. Rudberg,[2] writing in 1921, had collected forty-one cases.

A typical report of a case of traumatic rupture of the common duct was made by Garrett[4] in 1900.

A young farmer of 21, while walking on a beam, carrying another beam on the shoulder, fell in such a way that the right side of the abdomen struck the beam upon which he was walking, the beam on the shoulder at the same time falling and striking the abdomen on the opposite side. There was considerable shock. The next day he was better and there was such rapid improvement that he was discharged on the fourth day.

He did well for a week when there was severe epigastric pain and Garrett found a distended abdomen and slight jaundice. A paracentesis recovered six quarts of yellowish green fluid. It was repeated four days later, and again seven days later, about four quarts of the same character of fluid being recovered each time.

Finally, a diagnosis of rupture of the gall bladder having been made, and the condition of the patient having become worse, he was operated upon twenty days after the injury, when it was found that the common duct had been ruptured close to the liver. Gauze packing was placed in funnel shape down to the foramen of Winslow and a drainage tube introduced. The after course was characterized by nervousness, restlessness and progressive emaciation. Bile appeared in the feces on the ninth day. He left the Hospital on the twenty-eighth day still discharging bile. A month later he was doing well.

In examining the histories of the cases reported by Garrett, Waugh,[3] Kittrel,[5] Rudberg, Wallace and Spiro and others, one finds that the common cause is the sudden application of a crushing force to the right upper abdomen, exactly as in our case. In one case the patient, like ours, was crushed between two automobiles. In another a wagon wheel ran over the abdomen.

In practically all the histories we have examined there was more or less pronounced shock at first, followed by a period of comparative well-being for from a few to ten days.

A rather constant sign was jaundice about the third day, but it is usually described as "slight."

There are clay colored stools in from two to five days and at the same time there is bile in the urine.

A striking phenomenon is the presence of an enormous amount of uninfected bile in the abdomen a week to ten days after the injury, without any clear evidences of peritonitis.

Notwithstanding the period of relative calm, the average history shows progressive loss of strength with increasing rapidity of the pulse, the exhaustion being produced through the slow but constant absorption of bile from the peritoneal cavity. It has been suggested that the bile salts attack the myocardium. The data that we have collected would seem to indicate that, while normal bile in the peritoneal cavity is tolerated sometimes for many days, there is progressive exhaustion from which the patient usually dies without the clinical signs of a typical peritonitis. Operative procedures and autopsies invariably reveal peritoneal inflammation, but usually without suppuration.

The history of a crushing injury of the right upper abdomen, followed in a few days by slight jaundice, bile in urine, absence of bile from the feces, and later, usually from a wek to ten days, a distended abdomen, flat on percussion, practically establishes the diagnosis of rupture of some part of the biliary tract. If there is any doubt, paracentesis furnishes definite and valuable information.

The treatment employed by the various reporters is altogether operative and may be considered under the following heads:

(1) *Repeated Aspirations.*—This we consider unscientific, indefinite and inadequate, because the exact location and character of the injury cannot be determined, the extravasated bile is removed intermittently, and it is not possible to remove all of it at any time. We have been able to find but one case of improvement after repeated aspirations, and in that case, reported by Kittrell, under the title, "Injuries of the Biliary Tract," the recovery was incomplete, the reporter stating that the patient "occasionally became jaundiced and has at these times a hard swelling in the region of the convex surface of the liver."

(2) *Laparotomy, with Repair of the Rupture.*—In the case of the ducts, this is usually not practical. This is particularly true of the hepatic duct on account of its smallness and inaccessible and dangerous location. Besides, even in repair of the common duct proper, that is, the duct below the cystic duct, there is danger of stenosis, as in a case reported by Rudberg, who had to operate for the relief of stenosis a year after repair of the duct.

(3) *Laparotomy, Removal of Bile, Drainage and, if Possible, Relief of Intra-Ductal Pressure.*

The technic has already been indicated in our case report. It is based, primarily, upon the well known tendency to repair in connection with wounds of the bile ducts, at the same time considering the wisdom of shortening the operative procedure as much as possible in the case of a patient in the midst of a severe toxemia and with strikingly low resisting power.

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DISCUSSION (*Abstract*)

Papers of Dr. Brooks and Dr. Long.

Dr. Frank K. Boland, Atlanta, Ga.—The greatest help we get from cholecystography lies in the prevention of unnecessary operations on the gall bladder. Negative reports have stopped many contemplated operations in my own hands. The positive diagnosis of gall bladder disease, if it is pronounced, is usually made from the history and clinical signs, and the greatest value of cholecystography is in the negative report. I consider this method of examination even more valuable than are skiagrams of the gastro-intestinal tract. The percentage of positive results is greater than in the gastro-intestinal series with x-ray and barium.

Not much was said about treatment, although the title of Dr. Brooks' paper dealt with treatment as well as diagnosis. All that was said referred to cholecystectomy. I think many patients need cholecystotomy rather than the more radical measure. In his clinic yesterday Dr. Bryan brought out the value of early diagnosis and early treatment of cholecystitis in preventing complications in the intestinal tract and other parts of the body as the result of focal infection.

Dr. W. A. Bryan, Nashville, Tenn.—One of the questions that it is necessary to settle is whether a patient who has had an inflammatory process in the gall bladder ever really gets over it. Some men say that an appendix once diseased is always diseased, and that a gall bladder once diseased is always diseased. If we postpone operation until the gall bladder is obviously diseased, a high operative mortality will frequently follow.

We do not know, and there is no way of finding out how many individuals are dying of cholecystitis indirectly. A man may die of myocarditis who has a bad gall bladder. One patient dies of apoplexy, another develops a pancreatitis, another a severe rheumatism, who has cholecystitis.

I have nothing to say about the definitely diseased gall bladder, where the patient diagnoses the condition himself and demands operation. The problem lies in the earlier cases. The patient cannot work, belches, is uncomfortable. If the gall bladder causes these symptoms, the earlier we remove it the better it is for the patients. The roentgenologist may report after a Graham test: "I do not see enough evidence to say that the gall bladder is diseased, but I am not sure about a shadow."

Much study and great care are required before we can say that a man or woman who comes to us with a condition that might be due to the gall bladder, should be advised to do nothing.

Dr. Francis J. Kirby, Baltimore, Md.—Frequent recourse to roentgenograms is doing much to improve our knowledge of conditions in the gall bladder. It is teaching us something of the function of the gall bladder, its activities in health and disease, of the recognition of gallstones and other pathological lesions, which were very hazy before. It is impossible for any surgeon to demonstrate on the operating table minute pathological changes in some of the thin walled gall bladders, even in those containing stones. These can be elucidated only in the pathological laboratory, with the microscope.

There is no question about the removal of the atrophic thickened fibrous gall bladder, behind the liver tightly contracted and containing stones, or about gall bladders which are undergoing gangrene, or are filled with pus and stones, with obliteration and thrombosis of the blood vessels and destruction of the circulation. It goes without saying that these should be removed.

But the wholesale removal of smooth, thin-walled, pale bluish gall bladders, with no surrounding adhesions, very little if any evidence of peri-inflammatory change, (because they are easy to take out) I deplore.

Unfortunately there is an idea still extant in the minds of many physicians and the laity, that the removal of a gall bladder prevents the recurrence of gallstones.

Given a diseased gall bladder, where does the infection come from? Upwards from the intestinal tract, or from some general systemic infection such as typhoid fever? If we remove these gall bladders have we any evidence that there is not some lesion in the hepatic or smaller ducts in the liver, where we can not as yet get a good cystogram, which lesion may remain to make trouble?

Removal of the gall bladder does not prevent the recurrence of gallstones; it does sometimes inhibit proper and free drainage of the ducts, especially the small duct ramifications, and makes a later operation, if necessary, upon the ducts, much more difficult, and arduous for the patient.

Dr. R. L. Sanders, Memphis, Tenn.—I desire to emphasize Dr. Brooks' warning about the prophylactic removal of gall bladders. Such operations are fraught with a certain amount of danger and the results are disappointing.

In our clinic we have records of more than 1,700 cases of cholecystitis, 30 per cent of which have been

treated surgically. Cholecystectomy was done in more than 95 per cent of them. Recently I have been studying this series and find that the end-result is just about in proportion to the amount of disease found in the gall bladder and liver at the time of operation. Usually the worse the condition of the gall bladder when it is removed, the better the final result, and vice versa. When the clinical history is positive and the surgical findings justify cholecystectomy, most of our cases have been benefited. On the other hand, when the history is not sufficient nor the operative findings enough to warrant removing the gall bladder, our results have been quite unfavorable. Such patients never develop writer's cramp. They keep reminding us that the state after operation is worse than before and they discourage all their friends about gall bladder surgery. I am becoming more and more skeptical of the so-called prophylactic cholecystectomy.

Dr. G. T. Tyler, Jr., Greenville, S. C.—I should like to add one case to the list that Dr. Long has presented. The condition is a surgical one: operation is almost always, if not always necessary. A negro boy in his middle 'teens was closely following a wagon down hill. He fell with much force against the end of the coupling pole, which struck him in the upper right quadrant of the abdomen, near the costal border. He was brought to the hospital, and kept under observation. Since no symptoms resulted, he was dismissed in a few days. Three weeks later, he returned with jaundice and a greatly distended abdomen. Aspiration revealed bile-stained fluid, of which between two and three gallons was removed. The next day, the abdomen was opened. The gall bladder was intact, and no rupture of the bile ducts could be demonstrated. Cigarette drains were placed down to the cystic duct, and the abdominal wall closed around them. The patient made an uneventful recovery. When I saw him more than a month after leaving the hospital, he was in good health, having had no symptoms in the interval.

I suggest that unless an emergency exists in these patients with suspected rupture of the bile passages, the gradual filling of the abdomen may have a mechanical effect in preventing the more rapid escape of bile. Hence the advantage of delaying operation. After the fluid is aspirated, laparotomy should be deferred at least twenty-four hours. In the absence of gross lesions, drainage is all that is necessary to allow the injury to heal.

Dr. Brooks (closing).—From my own experience I believe the result obtained from extirpation of a gall bladder which does not show definite anatomical pathological changes is often unsatisfactory. The greatest value of cholecystography lies in the fact that a careful application of this method gives results on which the anatomical pathological changes of the gall bladder may be estimated.

During the period in which the one hundred patients, discussed in this paper, were observed there were sixty other patients who had the clinical manifestations of disease of the gall bladder, but who showed, on cholecystographic examination, a good shadow and who were not operated upon. A study of the subsequent results of these patients is necessary for the determination of the true value of cholecystography.

ABDOMINAL TRAUMA*

By FRANK S. LYNN, M.D.,
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In the consideration of this subject, gunshot and stab wounds of the abdomen will not be discussed as their diagnosis is usually simple and their treatment well defined.

In a recent article the statement is made that injuries to the abdominal viscera are of "grave importance to the surgeon." This statement is correct as far as it goes. It may be extended to read that these injuries are of grave importance to the surgeon but of much graver importance to the patient. The seriousness of the situation cannot always be gauged by the extent of the external injury. The majority of cases are at first looked upon as of only minor consequence. This in part is due to the fact that patients at the beginning complain of very few symptoms and also to the fact that in a large number of abdominal traumas there is no external evidence of an underlying injury. It is only after the symptoms of hemorrhage and of a rapidly spreading peritonitis develop that the seriousness of the situation is fully realized.

The cases that I am about to present demonstrate the most common lesions found in these injuries. Other rare conditions are found, but on the whole the illustrative cases in this series present the usual conditions.

Case 1.—C. W. S., was a white boy age 17. On January 14, 1922, at 10 a. m., while coasting, his sled ran into a tree, the anterior surface of the abdomen coming into contact with the tree with great force. The point of impact was in the epigastric region. He was seen by his family physician, who immediately called a surgeon in consultation. His temperature was 102.2°; pulse rate 80. He did not appear shocked. His abdomen was rigid, with dullness in the right flank, and there was tenderness over the whole upper abdomen especially over the right hypogastric region. Rupture of the liver was suspected. The abdomen was packed in ice. The patient responded to treatment well that day and the next. The following day on Monday, January 16, his pulse rate increased very rapidly and he began to vomit coffee ground fluid. He was again seen by a surgeon at 7 P. M. and a diagnosis of ruptured viscus was made. He was immediately removed to the hospital where a right rectus incision was made. When the peritoneal cavity was opened a quantity of blood escaped. The kidneys, spleen and stomach showed no injury. Examination of the liver on the superior surface showed

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a wound three inches long, very shallow, which was bleeding actively. On account of the inaccessibility of the wound beneath the diaphragm, no attempt was made at suturing. The wound was packed with gauze and the bleeding stopped. The patient was immediately given a blood transfusion and gradually came out of his shock. Three weeks after the injury he developed a subphrenic abscess which was drained through a rubber tube. He was finally discharged from the hospital fully recovered.

Case 2.—S. G., a white girl, age 6, was admitted to the hospital on August 8, 1927. Two days before admission she was struck in the left side of the lower chest with a baseball. The parents were gypsies and following the blow in the abdomen they paid very little attention to it. As time went on the child complained of considerable pain. They called a physician who had the child sent to a hospital as he found that she was suffering with considerable pain and marked abdominal rigidity.

There was an increased leucocyte count and the child had some fever. Claybrook's sign was distinctly positive. There was no external evidence of any injury. Because of the location of the blow a diagnosis of ruptured spleen was made. Immediate laparotomy was done. On opening the peritoneal cavity a large quantity of blood was found. There was a stellate fracture of the spleen. The spleen was delivered, the pedicle clamped and ligated and a splenectomy done. Two cigarette drains were placed in the splenic fossa and the incision closed. Following operation the child's condition progressed very favorably and she was discharged from the hospital two weeks after admission.

Case 3.—E. O., a white boy of 14, was admitted to the hospital in the fall of 1917. This boy in crossing a road, was run down by an automobile and the rear wheel had passed over his abdomen. His family physician was called and sent him to the hospital at once. He was in a condition of shock. He was tender over the left upper quadrant of his abdomen and the muscular rigidity was marked. A diagnosis of probable rupture of the spleen was made. The patient was taken to the operating room where a left rectus incision was made and a small fissure was found in the spleen. This was closed by a figure of eight suture. There was also a hematoma on the anterior wall of the stomach. After the laceration of the spleen was repaired all active bleeding ceased. The peritoneal cavity was cleansed of all blood and gauze drains were placed down to the ruptured spleen. The incision was closed around the drain and the patient responded to treatment following operation. About a week following operation, however, he developed a gastric fistula. This in time closed spontaneously and the patient was discharged from the hospital at the end of three weeks in very good condition. He returned to the hospital about four months following his operation with an intestinal obstruction. This was due to coils of small intestine which were adherent to the anterior abdominal wall at the upper angle of the incision. After this was released the patient had an uneventful recovery. At the present time he is enjoying good health and is now practicing law.

Case 4.—E. L., a white woman, age 58, was admitted to the hospital on May 24, 1927. Twenty-four hours before admission while doing her work about the house she fell from a step ladder and struck the lower portion of her abdomen. She suffered acute abdominal pain and shock. Her physician advised removal to the hospital immediately but this she refused. As her symptoms became progressively worse she finally consented to come to the hopital. On admission there was a markedly distended abdomen, rigid throughout and very tender; there was no external evidence of injury to the abdominal wall; there was costal respiration. A diagnosis was made of diffuse peritonitis due to a ruptured viscus. Shortly after admission she was taken to the operating room where a left rectus incision was made. On opening the peritoneal cavity a large quantity of pus was evacuated and thick exudate covered the small and large intestines. An opening in the small bowel (ileum) was found, 2 cm. in diameter. This was closed with mattress sutures of fine silk and the peritoneal cavity was drained. This patient was given continuous infusions but in spite of all supportive measures she succumbed twenty-four hours after the operation.

Case 5.—J. L., a boy of 14, about 6 o'clock in the evening, while playing baseball, stumbled over a cross tie and fell across a rail striking the upper portion of his abdomen immediately above the umbilicus. There was a slight abrasion of the abdominal wall. When first seen he complained of some pain and was moderately shocked. He responded to treatment and the following morning his pulse was 100 and he was suffering very little pain. About twenty-four hours after his accident the patient suddenly went into collapse. The physician was called and sent him to the hospital. On admission the patient's pulse was about 120, his temperature was normal but his abdomen was markedly distended, he was rigid throughout and exquisitely tender. He also had hippocratic facies and the respirations were costal in character. The picture was one of diffuse peritonitis. A laparotomy was performed and on opening the peritoneal cavity a large quantity of pus and fecal matter were evacuated. The intestines were coated here and there with thick fibrinous exudate. On seeking the site of the damage an opening 2 cm. in diameter was found in the jejunum which was about 10 cm. from the duodeno-jejunal angle. This opening was closed with mattress sutures of fine silk and drainage was instituted in the pelvis. A quantity of normal salt solution was placed in the peritoneal cavity and preparations were being made for a blood transfusion when the child succumbed.

Case 6.—H. C., a white man, age 55, was admitted to the hospital on August 25, 1927, in a condition of profound shock. He was complaining of excruciating abdominal pain. His color was livid, his skin cold and clammy, his pulse was weak and thready, and his abdomen was markedly distended and tympanitic throughout. The history was that while at work one of his fellow workmen placed an air hose close to his rectum and after this he had pain and went into a state of collapse. It was our impression that he had a perforated bowel. Under a light gas anesthetic the abdomen was opened through a low right rectus incision.

When the peritoneal cavity was opened a large quantity of gas escaped with a hissing sound just as one would hear from a small blow-out of an automobile tire. As the air escaped the abdomen immediately became flat. The patient's color gradually came back and his pulse and respirations improved very markedly.

In the peritoneal cavity besides air was a small quantity of clear fluid and a considerable amount of formed fecal matter. Very little bleeding took place but a hematoma was found behind the peritoneum leading from the sigmoid down to the rectum. Tracing down

along this hematoma there was found a laceration in the anterior surface of the rectum about three inches long, this laceration extending through all the coats. It was closed with catgut and fine silk and drainage was instituted in the pelvis. For the first two days following operation the patient responded to treatment well but on the third day he became very cyanotic and developed a troublesome cough. Chest examination revealed numerous rales. His abdomen was soft and he complained of no tenderness. The pulmonary condition became progressively worse and finally terminated in an acute pulmonary edema to which he succumbed.

Case 7.—A. J., a white man, age 44, was admitted to the hospital on February 14, 1924. Four days previously while intoxicated he fell down several steps. The following morning after he had sobered up he complained of abdominal pain. He sent for a physician who saw him once, gave him some medicine, and did not return. The patient grew progressively worse and sent for another physician in his neighborhood. The patient complained that he had voided very little, so this second physician catheterized him and recovered about an ounce of urine. He was immediately sent to the hospital where we found that he had a very hard abdomen with evidence of fluid in the abdominal cavity. He was again catheterized and in spite of the fact that ever since the accident he had been drinking large quantities of water, we recovered only about 2 ounces of urine. He had no fever but had a leucocytosis and his abdomen was rigid throughout and tender. There was no evidence of any external injury of the abdominal wall.

It was our impression that the patient had a ruptured bladder. Shortly after admission he was taken to the operating room where under procain and gas anesthesia a suprapubic incision was made. The peritoneal cavity was opened and a rent was found in the posterior wall of the bladder about 3 cm. in length. This opening was closed with catgut sutures. The pelvis was then drained and the incision closed. The patient had a very stormy convalescence but was finally discharged from the hospital about four weeks after admission. Since that time he has enjoyed excellent health except that he has a small ventral hernia.

Case 8.—A white boy, age 16, was admitted to the hospital on October 6, 1926. While riding a bicycle he was run into by an automobile truck which threw him and passed over his abdomen. On admission to the hospital he was in a condition of profound shock. He had a laceration of the right knee and numerous abrasions about the back. His abdomen was tender but scaphoid. It was my impression that he was suffering from concealed hemorrhage and had some injury to the abdominal viscera. Immediate operation was decided upon. Urinary examination was negative, no blood being present. A right rectus incision was made and upon opening the peritoneal cavity a quantity of blood escaped. About four or five hundred c. c. of blood were removed by suction. A large hematoma was found on the great omentum about the size of a medium sized orange. Another hematoma was found in the mesentery of the ascending and transverse colon. These hematomas extended well beneath the posterior parietal peritoneum. No active bleeding was found after a thorough exploration of all portions of the abdomen. As the bleeding in the hematomas seemed to be checked by the thrombosis, no attempt was made to remove them. A stab wound was made above the pubis and a rubber tube was inserted in the pelvis. The right rectus incision was then closed with catgut and fine silk. The patient was profoundly shocked. Immediately at the close of the operation he was given a transfusion of 500 c. c. of blood. After a very stormy convalescence, he showed considerable improvement, and was discharged from the hospital with his condition improved.

Case 9.—J. G., a white boy, age 15, was admitted to the hospital about 6 o'clock in the evening with a history of having fallen from a scaffold a distance of about 30 feet. On admission he had a compound fracture of the right leg and an injury to his left foot, probably a fractured os calcis. The wound was cleansed and the compound fracture of the leg was immobilized. The patient seemed to be in fair general condition except that he had a moderate degree of shock. He complained of no abdominal symptoms.

The next morning the patient was in a condition of profound shock. Abdominal examination revealed an irregular area of dullness below the umbilicus. He was catheterized and a large quantity of urine recovered, but the suprapubic dullness persisted. The portion of his abdomen above the umbilicus was soft and not tender. Claybrook's sign was negative. The boy's mucous membranes were very pale and while his pulse was about 130 it had very little volume. His blood pressure was so low that any operative procedure was deemed inadvisable. While preparations were made for a transfusion, normal salt solution was administered very slowly and the patient gradually recovered from his shock. The dull area of the abdomen that day showed no increase and the following day and every day thereafter showed a tendency to diminish in size. It was our impression that the patient probably had a fractured pelvis with an extra-peritoneal hematoma. After his condition had improved to such an extent that a general anesthetic was safe, the position of the fracture was improved and immobilized in a plaster of Paris cast. At the same time a suprapubic incision was made and about a quart of clotted blood was removed. A small drain was inserted and the incision closed around the drain. The boy made an uneventful recovery as far as his fractured pelvis and abdominal condition were concerned.

The history in these cases, as in all others helps us considerably in forming our conclusions. We must take into consideration whether the hollow viscera are empty or distended, and whether the individual has fully or meagerly developed abdominal muscles. The damage done by the force of the impact is greatly determined by the foregoing considerations.

With these facts in mind, when a patient with a history of a blow in the abdomen falls into our hands, it immediately becomes our duty to give him the usual very careful and minute examination, and even though nothing definite can be made out during this examination, to keep him under careful and frequent observation, so that when the danger signals of hemorrhage and beginning peritonitis manifest themselves the necessary surgery may be immediately instituted. I do not believe that we can overestimate the importance of the careful and close observation of cases of this kind, because upon their early

diagnosis, more than any other consideration, the prognosis depends. The surgeon may perform a most beautiful reparative operation and yet if the diagnosis has been made late, all of his technical work will go for naught.

Symptoms.—Abdominal injuries usually present the following train of symptoms: shock, pain, prolonged and progressive, tenderness, and muscular rigidity with occasional nausea and vomiting and acceleration of pulse. Where bladder or kidney injuries are suspected, catheterization will give us valuable information. And while great stress is laid upon tenderness revealed by rectal examination, this cannot be relied upon as it is negative as frequently as positive. Another sign described by Claybrook is transmission of heart and breath sounds through the abdominal wall. When present Claybrook claims that this sign is a postive indication for operation in the absence of other indications of grave trouble. He claims that it is present as soon after injury as one-half hour. It continues in cases not operated upon as long as twenty-four hours and in some cases lasts for days. His opinion is that it is due to irritation in the parietal peritoneum caused by the sudden outpouring of foreign material.

It so happens that all of these signs and symptoms are not always present in each case, but usually there is a sufficient number to be of value in reaching a diagnosis. My own experience in such cases coincides very closely with that of Krecke, who states:

"Tension of the abdominal walls is the sole infallible symptom of organic lesion within the abdomen. Its presence justifies immediate intervention."

Another sign to which he calls attention and which he places second in importance is costal breathing. He advises that

"The patient be carefully observed while in repose. If the abdominal wall is immobile while the thorax responds to deep breathing, a perforated lesion of the abdominal cavity may be assumed. The patient's face expresses great distress under such circumstances."

These indications demand immediate surgical interference, and even though there is some doubt in the mind of the surgeon as to whether any intra-abdominal damage has been done, it is far better to do a laparotomy and have negative findings than to procrastinate because of doubt and then interfere when it is too late. I do not wish to say that all cases of abdominal trauma should be subjected to operation immediately following an injury, because we all know that even a slight contusion of the abdominal wall will produce a certain amount of shock and pain, but this period of shock is transient and passes off within an hour or so. However, where the shock persists and where evidences of infection make their appearance in the form of continued and progressive pain, one should not temporize.

What I have just said is substantiated by Lord, who in reporting on a number of cases where rupture of the intestine has been sustained, makes the following remarks:

"The symptoms, which at first ensue from a rupture, may be and often are so slight that the surgeon feels a false amount of security. He judges that no harm has been done so the patient is left until general peritonitis has developed before he is operated upon. In cases which have been subjected to an injury of this sort, an exploratory laparotomy should be done without waiting for an absolutely certain diagnosis, which also means the almost certain death of the patient. The patient is often very faint, sometimes vomits, and then the rapidity with which the symptoms come on depends upon the rapidity with which the intestinal contents are poured into the abdomen. If the rupture is small, as not infrequently happens, it may be nearly closed by protruding mucous membrane. Here the pain, tenderness, muscle spasm and temperature indicative of peritonitis may gradually develop, or if the rupture is a large one the rapid extravasation of intestinal contents brings into immediate evidence symptoms of general peritonitis and leads to immediate operation. The peritonitis must be quite general before the patient looks badly. The pain, tenderness, muscle spasm, slight rise in temperature and the fact that the patient is getting worse should be sufficient grounds for immediate operation without waiting for the facies which practically always indicates that peritoneal sepsis has progressed to such an extent that no operation will control it."

The same may be said in regard to the injury of any parenchymatous structure where hemorrhage is apt to be fatal. Here the initial shock becomes intensified and if it grows more profound, a laparotomy should be done for the purpose of repairing the damage and controlling the hemorrhage.

The pathological condition in these cases depends entirely upon the particular viscus which may be injured. The general condition is that of shock and hemorrhage in the case of injury to a parenchymatous viscus, and of shock and a diffuse peritonitis where a hollow viscus has been injured. Occasionally there may be some evidence of a contusion or abrasion of the abdominal wall.

Diagnosis.—In making the diagnosis of these cases the last point mentioned should be again emphasized. I do not believe that we can dwell on this point too strongly, namely: that the great majority of these cases are devoid of any external evidence of an internal catastrophe. The insidious onset of the symptoms is often misleading and often deceptive to one in arriving at a correct interpretation of the patient's condi-

tion. We should never wait for a patient to have an elevation of temperature, because when this occurs the peritonitis is usually of such extent as to make the case almost hopeless. The two outstanding signs in the order of their diagnostic importance are the muscular rigidity or abdominal tension and the costal breathing. In these cases it is not the question of what particular organ is the site of the injury, but the opinion that some damage has been done within the abdominal cavity is sufficient grounds for us to institute the proper surgical procedure.

Treatment.—Abdominal injuries group themselves into three divisions. The first group includes those in which there is some doubt as to the amount of injury. These should be watched for a reasonable length of time. The second group contains those in which there is a frank intra-abdominal injury. Here, immediate operation and repair of the damage should be done. The third group is made up of cases in which the shock is so profound that it is well to treat the patients supportively in an endeavor to prepare them to stand an operative procedure.

SUMMARY

(1) External evidence of injury is very rare.

(2) In any traumatic condition of the abdomen the patient should be watched most closely for progressive symptoms.

(3) To wait for an elevation of temperature in most cases is to lose very valuable time.

(4) The two unfailing signs of any abdominal injury are abdominal rigidity and costal breathing.

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DISCUSSION (*Abstract*)

Dr. Page Edmonds, Baltimore, Md.—Injuries to the abdomen present innumerable varieties. When in doubt open the abdomen and look in, is the lesson to be learned from Dr. Lynn's paper. Much less damage will be done than by waiting for a definite diagnosis.

The cases that are interesting to me are not the gross injuries of the abdomen, but the injuries due to indirect violence.

Of course, the great trauma of the abdominal wall that railway surgeons have to deal with is the hernia which we have to accept as being due to trauma. Very recently I had a case in court in which it was alleged that a perforating duodenal ulcer was due directly to a straining effort that the patient made when engaged in his occupation. Fortunately this strain from the slipping of a jack on the car occurred three days before the perforation of the gastric ulcer.

In 1926, at Montreal, the American College of Surgeons, you will recall, found it worth while to appoint a special committee to look into the possibility of the relation of injuries to appendicitis. You are probably familiar with the fact that they have no direct connection.

Dr. Lynn (closing).—The points I wish to emphasize in the diagnosis are, first, a negative one, namely, the absence of any external evidence of an internal catastrophe in the majority of these cases; second, the abdominal rigidity, which is always present; and third, the costal breathing which is a very frequent sign.

ROENTGENOLOGIC DIAGNOSIS OF GASTRIC ULCER*†

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To the comparatively recent and marked advance in knowledge regarding gastric ulcer the roentgen ray has contributed its full share. As early as 1897, only two years after the discovery of the ray, Williams, the Nestor of American roentgenologists, assisted by Cannon, employed bismuth subnitrate mixed with food to depict the human stomach in the roentgenogram. Shortly afterward, Hemmeter suggested that bismuth might adhere to the mucus and detritus in the cavity of an ulcer and thus exhibit its site. His experiments yielded uncertain results, but were not altogether fruitless. Then Reiche, in 1909, after filling the stomach with a bismuth meal, was able to demonstrate the niche-like crater of an ulcer, and a firm foundation was laid for the roentgenologic diagnosis. Today confident reliance is placed on the roentgenologic examination to discover gastric ulcer, distinguish it from duodenal ulcer and other clinical simulants, and reveal its size and situation.

The roentgenologic signs have been amplified until they now comprise the niche, exaggeration

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†From the Section on Roentgenology, The Mayo Clinic.

of the hook form of the stomach, residues from the six-hour meal, convergence of the gastric rugae, antral deformity, incisura, hour-glass contraction, fixation by adhesions and disturbances of peristalsis. These manifestations occur in varying combinations, of course, and the composite picture differs accordingly from case to case. They also vary widely in diagnostic weight. Some are merely the reflex of numerous organic or functional states, others are strongly indicative of a gastric lesion, and only one is characteristic of gastric ulcer.

The sole pathognomonic sign of ulcer is the niche, the barium cast of its crater. When seen in profile the niche appears as a localized prominence on the margin of the gastric shadow. Ordinarily, the niche-shadow is rather hemispherical and smooth, but it may be triangular or irregular in shape. Craters of most ulcers are scarcely more than a centimeter in diameter, often less, and occasionally the niche is so small that it is not readily apparent.

A magnified form of niche, the so-called accessory pocket, results from perforation of the gastric wall and extension of the excavation into the pancreas, liver, spleen or abdominal wall. Often the extragastric cavity is large and pouch-like, and it may be more or less pendant from the canal which unites it with the gastric lumen. Frequently its barium content exhibits a fluid-level, surmounted by an air bubble. Its roentgenologic appearance is striking and diagnostic, but only a small percentage of ulcers produces an accessory pocket.

Since a majority of ulcers are seated near the most dependent portion of the lesser curvature, in the vicinity of the angular incisure, this part of the gastric border should be scanned with especial care. The so-called saddle ulcer, with its crater exactly on the line of the lesser curvature, is not common; more often the ulcer is on the posterior wall and off the line, so that slight rotation of the patient is frequently necessary to exhibit the niche. Occasionally a marginal niche is situated high in the cardia or low in the pyloric segment, and very rarely it may have its seat on the greater curvature.

In a considerable proportion of cases the ulcer is on the posterior wall so far from the curvatures that its crater cannot be shown in profile at any practicable angle of view. However, if the gastric walls are approximated by manual pressure the crater will usually be demonstrable as a much denser spot within the gastric shadow, the fleck, or *niche en face*. Roentgenoscopic examination is indispensable to elicit the fleck, for it is almost never demonstrable on the film. Like the marginal niche, the central fleck is often small and easy to overlook. In many instances instead of maintaining their normal, more or less parallel course, the rugae converge at a certain point; at this point, unless the ulcer is healed, a fleck-niche will be found. A definite point of tenderness is another index to its probable site, and, conversely, tenderness to pressure over the fleck after it is found is an item of confirmation. In frequency of occurrence the fleck is a close second to the marginal niche, and unless it is regularly sought for at examination many gastric ulcers will fail to be discovered.

Counterfeits of the marginal niche and the central fleck are not wholly wanting. A small mass of barium in the bowel adjacent to the stomach may resemble a niche, but only at one angle of view. The marginal convexity between two peristaltic indentations which is conspicuous on the lesser curvature near the angle of the stomach is still sometimes mistaken for a niche, though it should not be. By manipulation a fleck of barium can be pent up transitorily between the rugae, especially if the latter are hypertrophic. But valid mistakes from any cause are so few that the reliability of the niche as a sign of ulcer can hardly be excelled.

Of the indirect secondary or collateral signs, there is one which merits especial emphasis, and that is the tendency of the antrum to become narrowed and curl toward the lesser curvature. This index is not new, for it was long ago described as the "snail form" of stomach, and it cannot of itself be considered diagnostic, but when it is present a careful search should be made for the crater of an ulcer. Spastic muscular contraction probably accounts for the narrowing and rolling up of the prepyloric segment, especially as spasm is a common attendant of ulcer in any part of the digestive tract. Sometimes the pyloric ring alone is narrowed and elongated. Whenever pyloric or prepyloric deformity is obviously of a spastic character, it is safe to assume that the cause is either a gastric lesion, perhaps a gastric ulcer, or some extrinsic disease, but not a duodenal ulcer.

Regardless of the situation of a gastric ulcer, the antrum is often grossly distorted by spasm. The antral shadow is irregularly blurred or largely effaced, and frequently the deformity changes in extent and configuration from moment to moment. Another form of spasm, the incisura, which is a persistent and stationary indentation of the

greater curvature opposite an ulcer, is a showy phenomenon, but has received more descriptive attention than it deserves, for it is rare and is not necessarily significant of ulcer or even of a gastric lesion. A constricting adhesion band, the cicatricial contraction of an ulcer, or, on the single film, a deep peristaltic wave, may produce the semblance of an incisura. After an antispasmodic has been given to full effect, gastrospasm from extrinsic causes usually disappears, while that due to organic disease of the stomach usually persists, and this test is often of value in diagnosis.

Organic hour-glass deformity is an occasional accompaniment of gastric ulcer, notably perforated ulcer with or without extragastric pocket formation. Usually the canal joining the loculi is short and near the lesser curvature, whereas in cancer or syphilis of the stomach the canal is likely to be long and centrally placed.

Perforated ulcers often become sealed at the serosa without producing any adhesions of consequence, but at times the adhesions are profuse and firm attachments result. Rarely the duodenal bulb is implicated in such adhesions and drawn toward the vertical portion of the stomach, producing an eccentric appearance.

Gastric motility is altered in a high percentage of cases. During examination the pylorus is likely to remain closed for periods longer than normal, and when it opens it permits only a scanty and brief outflow. A residue from the six-hour meal remains in the stomach in almost half the cases of ulcer. It is worthy of note that the retention occurs early, but the stomach is seldom dilated, while in duodenal ulcer retention is less common, occurs late, and the stomach usually becomes enlarged. Neither spastic pylorus nor six-hour retention is peculiar to ulcer and both may occur in the absence of any lesion whatever. However, failure of the stomach to empty itself in six hours of a bariumized carbohydrate meal, if no other food has been taken in the interim, calls for a thorough examination to exclude ulcer or other organic disease.

Indeed, the chief value of all the foregoing secondary manifestations of ulcer is to stimulate search for a niche. In a small minority of cases, notwithstanding the existence of an ulcer, a niche or fleck cannot be discerned. The prepyloric segment of the stomach is the most common seat of such ulcers, and in these instances the antrum is usually grossly distorted or its shadow partly obliterated by spasm, and a residue may remain from the motor test meal. As the deformity tends to persist after the administration of an antispasmodic, an extrinsic cause can reasonably be excluded, and as a mass corresponding to the defect cannot be felt, the lesion is probably not cancer. But the condition cannot be distinguished with confidence from coarsened antral rugae, hypertrophy of the pyloric muscle or possibly some other abnormality, and only the broad diagnosis of "prepyloric lesion" is warranted.

Occasionally a gastric ulcer is discovered after gastro-enterostomy for other disease. Following this operation, when symptoms have recurred and evidence of gastrojejunal ulcer cannot be elicited, gastric ulcer is to be considered. As the stomach empties rapidly the niche is not easy to demonstrate, but as a rule can be found by patient effort.

Rarely gastric ulcers are multiple and two or more niches, usually small and near together, may be visible. Instances of multiple prepyloric ulcers, which at operation proved to be tuberculous, have been observed. More than 10 per cent of gastric ulcers are associated with duodenal ulcer, and one or the other is likely to escape notice.

Ulcers of large size, for example those with a diameter equal to that of a quarter dollar or larger, are very often malignant, but not invariably so. Perforated ulcers which invade other organs and produce an extragastric pocket are almost uniformly non-malignant, however large and deep the cavity may be. On the other hand, a wide but shallow, non-perforated ulcer is likely to prove malignant. A great majority of ulcers of average size or less are benign, but exceptionally any of them, even the most minute, may prove to contain cancer cells when examined microscopically. From observation of a considerable series of cases I have derived a rather settled impression that malignant ulcers are less prone than benign ulcers to produce spastic manifestations or to cause fixation of the stomach as a result of perforation. Yet all these criteria are general and not necessarily applicable in an individual case. Ulcerating cancers in which the tumor element is obvious have a characteristic roentgenologic appearance and their malignancy can be predicted with confidence, but attempts at distinction between simple and malignant ulcer are often futile.

The roentgenologic estimate of the relative situation of an ulcer is valuable to the surgeon, particularly when the ulcer is small and not readily visible or palpable on exploration. It is to

be remembered that the stomach relaxes and elongates under anesthesia, and an ulcer in the median portion of the stomach is likely to be found two or three centimeters farther away from the pylorus than it appeared to be in the roentgenogram.

From a broad viewpoint gastric ulcer is far less frank and characteristic in its roentgenologic manifestations than other diseases of the stomach such as cancer, syphilis or benign tumor. It is also to be borne in mind that gastric ulcer has a relatively low incidence, and the belief that most peptic ulcers were pyloric or prepyloric had currency only at a time when duodenal ulcer was not well understood and the pyloric vein had not been established by the surgeon as a separating land mark. At The Mayo Clinic during 1927 more than ten times as many duodenal ulcers and more than twice as many cancers as gastric ulcers were diagnosed at roentgenologic examination. Statistically, therefore, gastric ulcers have a low incidence and they are less likely to be mistakenly diagnosed than to be overlooked. Finally, let it be said again that only a niche on the gastric border or a fleck within the gastric shadow fully justifies the diagnosis of ulcer. To find it may require close study, but it can be found in nine cases out of ten if spastic manifestations in general and prepyloric narrowing in particular are heeded as signals for careful and repeated search.

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DISCUSSION (*Abstract*)

Dr. J. W. Pierson, Baltimore, Md.—Dr. Moore's experience exactly coincides with ours, and we have met with the same difficulty as he in differentiating a true duodenal ulcer from a true gastric ulcer when the lesion is situated very close to the pylorus.

Dr. Moore stated that the presence of a filling defect on the lesser curvature of the stomach should always excite our suspicion of carcinoma. This is a point which cannot be too strongly emphasized. The differentiation of a large, benign ulcer from a carcinoma of the stomach is not always easy and sometimes we have to content ourselves with pointing out the location of the lesion and stating that it is a very serious one which will need surgical intervention.

Dr. Moore raised the old, familiar point of discussion of the malignant degeneration of gastric ulcers. Our experience regarding this phase of the subject has not coincided with his, which was borne out by the investigation of some five hundred cases. In this investigation regarding the incidence of previous gastric ulcer in cases of carcinoma of the stomach, our figures were not nearly so high as those reported by Dr. Moore and his associates.

We should remember that there is a difference of opinion among pathologists regarding the classification of lesions; for instance, there are certain types of lesion of the stomach which one pathologist would call benign and another malignant. This fact may account for the apparent discrepancies in the classification of lesions of the stomach.

Dr. Sidney K. Simon, New Orleans, La.—The incidence of malignancy and gastric ulcer is, of course, a question in which the internist is deeply interested. We are often confronted with the problem of deciding whether a patient should be operated upon for gastric ulcer or should go through the medical plan of treatment. Fortunately, the surgeons have issued the propaganda that carcinoma of the stomach frequently follows ulceration, and the general profession seems to be rather imbued with that idea.

I do not believe that the incidence of the occurrence of malignancy in gastric ulcer is quite so high as we were led to believe by previous reports. I believe that the Mayo Clinic has retracted to a great extent its early figures.

We gastro-neurologists believe that gastric ulcer is less amenable to medical treatment than duodenal ulcer, and certainly in the face of marked perforation the cases are frankly surgical. I do not think that medical men have any business treating them.

The mere fact of deformity, or the niche itself, does not necessarily imply malignancy. Malignancy does not develop so frequently as that.

Dr. George M. Niles, Atlanta, Ga.—A number of years ago, in the early days of the application of x-ray to the diagnosis of gastric problems, I spent some time with Dr. Lewis Gregory Cole in New York. Dr. Cole believes in taking many films, as you know. I have seen him take from 75 to 100 films of a stomach. The stomach is moving all the time, and some of the stomachs that are irritated by peptic ulcer are hyperperistaltic, so we have to photograph them as we shoot a bird on the wing. By taking a large number, I have found that in some of the films I got quite diagnostic pictures.

While Dr. Moore acknowledges a certain value in an incisura, he did not emphasize it. If we can show the incisura in the same place every time in a large number of films, especially as we give the patient belladonna, it means something.

An ulcer which happens to be on a lateral side of the stomach does not show in the profile at all. It is just as if it were on the wall there. Some of these give all the clinical symptoms, but it is very hard, indeed, to get a roentgenologic demonstration of them.

Dr. J. H. Edmonson, Birmingham, Ala.—May I ask Dr. Moore's assistance in some cases of peculiar peristaltic function?

A definite ripple of a peristaltic nature is shown in the upper third of the greater curvature, becoming deeper and more intense as the middle third of the stomach is reached. Then it disappears for a space

of about two inches. Palpation reveals a perfectly pliable stomach wall with apparently normal rugae. There is no indication of incision, niche or other abnormality in the study.

In my limited experience I have never been able to demonstrate on a film anything that I could not see on the screen.

Oversight of lesions, in my opinion, is due to improper posture rather than method of examination.

My routine is to place every portion of the stomach in the lateral, and study each portion for abnormality.

Dr. Moore (closing).—Dr. Pierson, I think, misunderstood me. I was letting sleeping dogs lie. I did not intend to use the word "malignant degeneration." I do not believe that it is within the province of the radiologist, the internist, the surgeon, or possibly the man who has the last say, the pathologist, to talk very much about malignant degeneration, because we know nothing about it. We are unable to say whether the malignant cells that we find in an ulcer are inflammatory cells that have become malignant or whether they have been malignant throughout the existence of the lesion.

Possibly this is a partial cause of some of the misunderstanding and the difference in statistics quoted from different quarters; we see lesions in the stomach in which we cannot roentgenologically distinguish between simple inflammation and malignancy. The surgeon sees such lesions and he cannot tell whether they are malignant or not. The pathologist can, and does, with great accuracy.

I am perfectly willing to admit that most of the lesions having the roentgenologic characteristics of ulcer are benign, but unquestionably a certain number of them are malignant. If radical surgical removal is to accomplish its best results in gastric carcinoma, the lesion must be excised when it is small.

Our figures agree with Dr. Simon's, that gastric ulcer probably is not so ready in its response to medical treatment as is duodenal ulcer; but I have seen some very satisfactory results from the medical treatment of gastric ulcer.

In my experience, the niche or crater of a mural ulcer can seldom be brought out in radiographs; it must be seen on the screen. The stomach must be palpated in order to approximate the walls.

I am afraid I cannot help Dr. Edmonson much. When you strike a portion of the stomach in which the peristaltic waves fade out and appear below, and there is no contraction, I hesitate to make a diagnosis of an intrinsic lesion. However, one should study that particular area carefully for some inflammatory lesion, such as a small ulcer, or an infiltrating cancer.

We are erring, probably, in attempting to study gastric peristalsis very scientifically with any of the methods we have. I have an idea, if anyone took me into a dark room and gave me a nauseous draught of barium when I was frightened and did not like it as much as other drinks, that my stomach would not respond in anything like a normal way. We should be lenient and forgiving and not expect too much of the barium-filled stomach.

THE DIAGNOSTIC AND PROGNOSTIC SIGNIFICANCE OF THE WHITE BLOOD CELLS IN ACTIVE TUBERCULOSIS*†‡

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and
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Boston, Mass.

The topic which has been chosen for presentation this morning has occupied the attention of clinicians and hematologists for many years. Indeed, the literature is so extensive that it cannot be reviewed at this time. It will be of interest, however, to refer briefly to a few of the more important references in order to show that authoritative physicians have differed widely in their opinion as to the significance of the white blood cells in tuberculosis. One writer says that a decrease in lymphocytes, a rising total leucocyte count and a shift of the Arneth index to the left are unfavorable clinical signs; another authority states that whereas there is a rising total number of white blood cells and a shift in the Arneth index to the left, there is no change in the lymphocytes, eosinophils or neutrophils; by some physicians, the view is held that the large mononuclear cells are increased; but still other workers believe that an increased number of large mononuclear cells in the blood of people with tuberculosis is of no importance. Clearly it may be seen from the studies of the past that an "unbridgeable chasm yawns" between the clinical findings and the recorded blood reports in so far as the diagnosis and prognosis of this disease are concerned.

The basis for such divergent conclusions readily becomes apparent when the reports in the literature are analyzed critically. Many of the hematological studies have been made either on a small number or on large groups of cases, in which only relatively infrequent blood examinations have been recorded; proper consideration has not always been given to the type of the disease, the stage of activity in the individual case or to the normal variation and daily fluctuation of the blood cells; too often attention has been focused on a particular cell or the number

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†From the Department of Pediatrics, the Harvard Medical School, and the Infants and Children's Hospitals, Boston, Massachusetts.

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DATE	W.B.C.	TOTAL MONO	TOTAL LYMPHO	M:L RATIO	
NORMAL FOR AGE	12,000	600	6,000	1: 10.0	0.10
1/13	9,000	720	3,240	1: 4.5	0.22
1/21	9,000	1,260	2,340	1: 1.9	0.53
1/24	9,000	1,260	1,620	1: 1.3	0.75
1/27	10,000	1,300	1,500	1: 1.2	0.83
1/29	12,000	1,560	1,080	1: 0.7	1.43

G.C.: Aged 3 mos. admitted with acute miliary Tbc. Death occurred 3 weeks later. Necropsy revealed extensive Tbc., the meninges not involved.

Table I

and relationship between several cells. Conclusions from data assembled under such circumstances, obviously, would result in a lack of uniformity in the findings, and it is not surprising that changes in the white blood cells have been believed to be of little, if any, practical aid in the diagnosis and prognosis of tuberculosis.

Recently, interest in the white blood cells in this disease has been renewed by the notable contributions of Sabin, Cunningham, Doan and their co-workers. These students of hematology, by the use of the supravital stain, as described by Sabin,[1] have advanced a clear conception of the origin and function of the white blood cells and have shown the importance of certain particular cells in experimental tuberculosis. Before considering the observations which we have made on patients, the classical work mentioned above will be reviewed.

Sabin and Doan[2] have demonstrated that the tubercle bacillus or its products affects primarily the monocyte, which term includes cells commonly known as transitionals and large mononuclears, and that by means of the supravital staining technic, ascribed to Sabin, this mononuclear cell can be differentiated from the clasmatocyte, a mononuclear cell which appears in the blood stream in a number of pathologic conditions.* They believe the monocyte and the clasmatocyte have a different anatomic origin, but under certain circumstances the common function of phagocytosis. The monocyte arises from a primitive stem cell which in turn comes from the reticular cells in the bone-marrow, spleen and lymph nodes. This primitive cell is also the parent stem from which the myeloid and lymphoid series of cells are derived. The clasmatocyte arises from cells which come from the endothelium, lining the sinusoids of the spleen and liver lobules and the capillaries of bone marrow, adrenal cortex and hypophysis. The erythrocytic series of cells also is derived from endothelium. In preparations of living cells, stained with neutral red and janus green, the monocyte has a definite centrosphere about which red granules are arranged in rosette form and vacuoles which are considered to be evidences of phagocytosis are arranged peripheral to the rosette, whereas the clasmatocyte has no rosette and the first vacuoles are immediately adjacent to the nucleus. The specifically differentiating points between these cells are the arrangement of granules in the rosette and the arrangement of the vacuoles. In the fixed smear, as pointed out by Sabin, the rosette in the monocyte is dissolved by alcohol fixation so that the typical pattern of granules is not visible and the cell cannot be distinguished definitely from the clasmatocyte.

In 1925, Cunningham, Sabin and Kindwall[3] called attention to the role of the monocyte in tuberculosis. They studied the effects of the tubercle bacilli in the tissues and in the blood stream of rabbits. Their investigations showed that the injection of living tubercle bacilli into the blood stream or intraperitoneally caused an over-production of reticular cells in the tissues and that the monocytes which arise from these cells increase and undergo modifications with the development of the epithelioid cell characteristic of the tuberculous

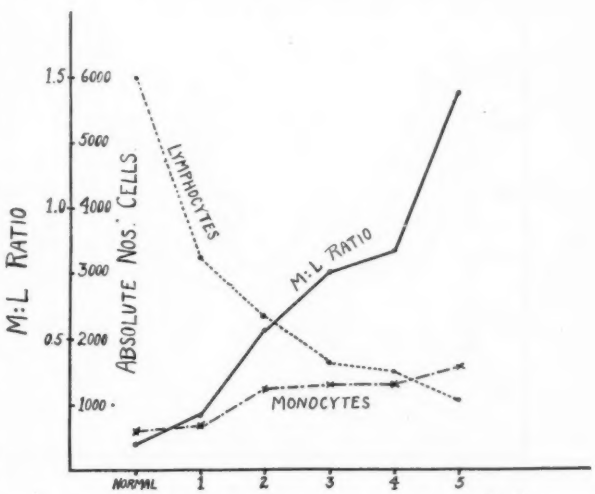

Chart 1

*In using terms monocyte and clasmatocyte we are following the classification of Sabin and her co-workers. The clasmatocyte is also known as the endothelial phagocyte of Mallory, the macrophage of Lewis and the histiocyte of Aschoff and Kioyno.

DATE	W.B.C.	TOTAL MONO	TOTAL LYMPHS.	M : L	RATIO
NORMAL FOR AGE	12,000	600	6,000	1: 10.0	0.10
2/27	20,000	1,000	4,000	1: 4.0	0.25
3/5	18,000	1,260	3,780	1: 3.0	0.33
3/9	20,000	3,200	2,800	1: 0.88	1.15
3/10	20,000	4,400	3,400	1: 0.77	1.30
3/14	20,000	2,800	1,800	1: 0.64	1.56
3/15	20,000	2,800	1,200	1: 0.43	2.33
3/19	25,000	3,000	1,500	1: 0.5	2.0
3/23	37,000	2,960	1,480	1: 0.5	2.0

R.S.: Aged 4 mos. admitted with acute miliary Tbc. and meninges. Death occurred 4 weeks later Necropsy revealed extensive miliary Tbc. — involving meninges.

Table II

lesions. This reaction is a local one in the tissues. It is reflected in the blood stream by an increase in monocytes and the appearance of epithelioid cells and transition forms between the normal monocyte and epithelioid cell (modified monocytes). It must be kept in mind that the recognition of epithelioid cells in the blood stream was made possible by the supravital technic. The authors also found that there is a constant correlation between the activity of the process and the total number of monocytes and the appearance of epithelioid cells in the blood stream. In rabbits, with actively progressive tuberculosis, the monocytes increase, in some instances forming 50 per cent of the total number of white blood cells, and the normal ratio between monocytes and lymphocytes is reversed. Modified monocytes and epithelioid cells appear in the peripheral blood. In arrested or healing tuberculosis the total number of monocytes falls, the ratio between the monocytes and lymphocytes returns to normal, and modified monocytes and epithelioid cells are not found.

The contributions of these investigators stimulated us[4] to study the peripheral blood of patients affected with tuberculosis. First, patients were chosen with acute miliary tuberculosis, inasmuch as this form in infants and children is similar to, if not identical with, the tuberculosis experimentally produced in rabbits. Subsequently, the study was extended to include different types of tuberculosis. At the same time that blood was taken for "supravital" staining, smears of blood were made from the same puncture field and stained later by the method of Wright. Each patient was followed by frequent blood examinations in an endeavor to correlate the variations in the white blood cells with the progress of the tuberculous lesion. The figures used for the normal percentage of monocytes and lymphocytes and the ratio of these to each other for the different age groups have been the average of figures given by Lucas,[5] Griffith[6] and Rogers[7] as well as figures obtained by ourselves.

We have secured data from thirty patients with clinical manifestations of tuberculosis. The age of the patients varied from three months to eleven years. The results of the blood changes can best be presented by dividing the series of cases into two groups.

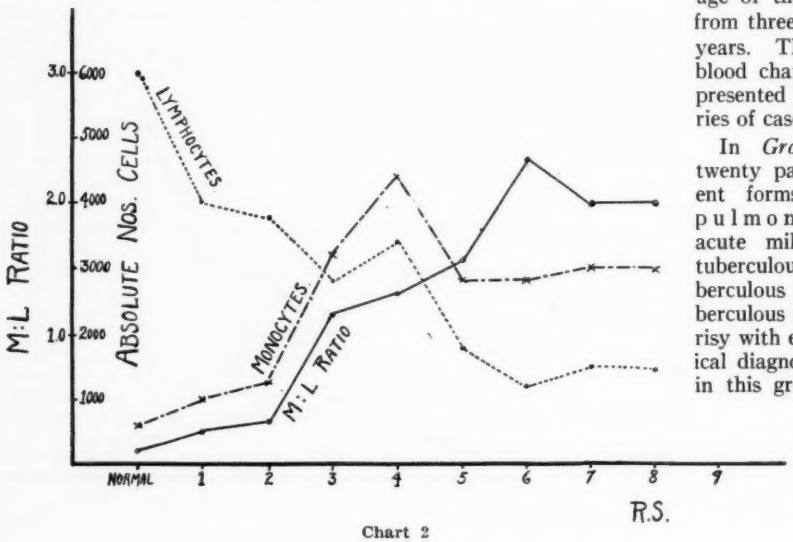

Chart 2

In *Group I* there were twenty patients with different forms of tuberculosis: pulmonary tuberculosis, acute miliary tuberculosis, tuberculous meningitis, tuberculous peritonitis and tuberculous adenitis, and pleurisy with effusion. The clinical diagnosis was confirmed in this group, by necropsy, animal inoculation, biopsy or direct demonstration of the tubercle bacillus. In these patients

DATE	W.B.C.	TOTAL MONO	TOTAL LYMPHO	M:L RATIO	
NORMAL FOR AGE	9,000	720	2,430	1: 3.4	0.30
3/9	12,000	2,040	3,960	1: 1.94	0.52
3/13	10,000	1,500	3,000	1: 2.00	0.50
3/18	10,000	1,200	3,800	1: 3.17	0.31
3/23	9,000	900	4,230	1: 4.70	0.21
3/27	8,500	170	3,655	1: 21.5	0.04
E.B.: Aged 11 yrs. Glandular Tbc. Diagnosis confirmed by biopsy. Blood findings denote active and healing stages. Note change in M:L ratio after 3/13.					

Table III

with proved tuberculosis it was found that during the active stage the peripheral blood contained a relative and an absolute in the number of monocytes and a corresponding decrease in the number of lymphocytes, or in other words an increased monocyte-lymphocyte ratio. In each patient modified monocytes and epithelioid cells were demonstrated by the supravital stain. During the healing or quiescent stage, the relative and absolute number of monocytes decreased with a corresponding increase in the number of lymphocytes. That is to say, the monocyte-lymphocyte ratio returned to normal and in certain cases the ratio went far above normal. Three illustrations of these findings are given (*Table I, Chart 1; Table II, Chart 2; Table III, Chart 3*).

In *Group II* there were ten patients in which the clinical diagnosis of tuberculosis was made. The patients were brought to the Hospital because of cough, fever, loss in weight, blood in the stools, and so forth. Nearly all of them presented physical findings suggestive of infection with the tubercle bacillus. Such technical procedures as the tuberculin test, roentgenograms, and search for the organism did not permit a positive clinical diagnosis. However, the findings of an increased monocyte-lymphocyte ratio, together with modified monocytes and epithelioid cells, strongly supported the clinical diagnosis, inasmuch as they were similar to the findings in the blood of the proved cases in *Group I*. The results of the studies in these two groups of cases confirm the work of Cunningham and Tompkins,[8] Rogers,[7] Morris and Tan[9] and others in human tuberculosis.

In experimental tuberculosis, the finding in the blood denoting activity of the process was the presence of modified monocytes and epithelioid cells. It is interesting to note that such cells were demonstrated in the blood in the patients just described when clinical evidences of activity of the disease were present. The characteristic cells (modified monocytes and epithelioid cells) were recognized readily and differentiated easily from other mononuclear cells by the supravital stain. In fixed smears, which, as mentioned previously, were taken at the same time, an unusual number of abnormal mononuclear cells were found in the active stages of the disease. These cells are two or three times the size of a polymorphonuclear leucocyte with a nucleus which may or may not be indented. Stained with Wright's stain, the nucleus is bluish-purple with a fairly definite chromatin network. The cytoplasm is dull blue with very fine bluish granules. Small vacuoles may be found at the periphery. Such cells apparently are modified monocytes and epithelioid cells. They paralleled, in the fixed smears, the number and percentage of the characteristic modified monocytes, determined by the supra-

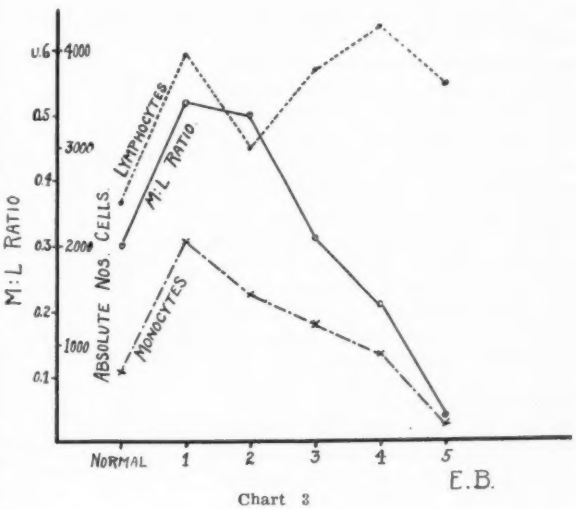

Chart 3

Parallelism between abnormal cells in "fixed" smear and modified monocytes in "supravital" smear.

SUPRAVITAL (200 cells)				FIXED (400 cells)			
Pmn.	Lympho	Mon o.	Mod. Mono	Pmn.	Lympho	Mono	Abn. Mono
80	8	6	6	81	8	7	4
76	10	7	7	79	9	6	6
75	9	9	7	73	11	9	6
70	21	7	2	71	20	8	1
65	30	3	2	68	30	1	1
60	38	2	0	64	35	1	0
E.F.: Aged 9yrs. Tuberculous peritonitis with recovery.							

Table IV

vital stain. This parallelism is shown in *Table IV*. The abnormal monocytes also were oxydase positive as contrasted with a small number of patients in which large mononuclear cells of endothelial origin (clasmatocytes) were found in the blood stream. We are fully aware that the differentiation of epithelioid cells in tuberculosis, in fixed smears is a disputable point. Nevertheless, when an unusual number of abnormal monocytes is found in fixed smear, tuberculosis should be considered, but confirmation as to the identity of the cells should always be sought by the supravital stain.

In our opinion, there is little question that the changes in the white blood cells when studied by the supravital staining method afford an added technical procedure of much value to the diagnosis and prognosis of tuberculosis. We wish to emphasize, however, that, although laboratory tests are of inestimable value, when carefully performed and correctly interpreted, they should be used chiefly as aids to substantiate clinical findings, and important points in history and physical examination must not be neglected. When carelessly performed, incorrectly interpreted or relied upon alone, there is grave danger that the tests will be harmful rather than beneficial to the suffering patient. Everyone has erred in making a diagnosis when the tuberculin reaction was positive, or failing to diagnose tuberculosis when the reaction was negative, not knowing or neglecting to remember that a positive reaction does not indicate activity and that a negative reaction may be present in extensive or overwhelming infection even when many times the routine amount of tuberculin is used. It must be kept in mind also that the roentgenogram merely shows evidences of infiltration or destruction of tissue. It does not tell us that the changes are caused by the tubercle bacillus.

These same pitfalls in laboratory diagnosis, open before us in regard to alterations in the blood. We have seen two instances in which the diagnosis of tuberculous peritonitis of the plastic type was confirmed by laparotomy. In neither of these patients was there an increase in number or percentage of monocytes, and the characteristic epithelioid cells could not be demonstrated in the blood, although search was made at daily intervals for several weeks. One patient recovered. The other patient died. It is easy to understand the blood picture in the patient who recovered, as it is known that epithelioid cells or an increase in the number of monocytes are not present in the blood during the healing or quiescent stage. It is more difficult to understand the blood findings in the fatal case, the only exception to the rule which we have encountered so far. This latter case illustrates that atypical reactions may occur and

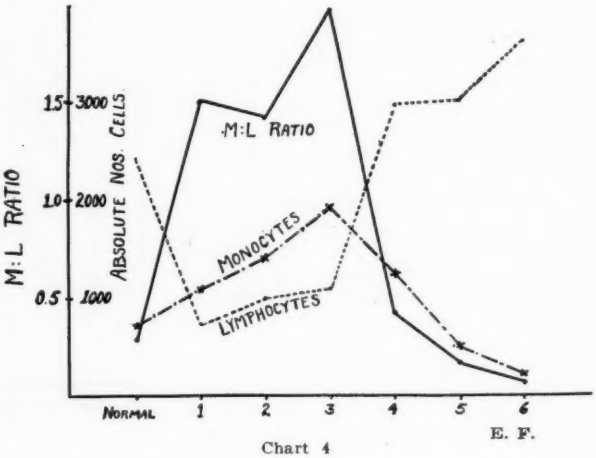

Chart 4

ESTIMATED NORMAL FIGURES

AGE	W.B.C.	MONO %	MONO TOTAL	LYMPHO %	LYMPHO TOTAL	M:L RATIO	
0-6mos.	12,000	5	600	50	6,000	1:10.	0.10
6mos.-1yr.	11,000	6	660	44	4,840	1:7.3	0.14
1-4yrs.	9,000	8	720	32	2,880	1:4.0	0.25
4-12yrs.	9,000	8	720	27	2,430	1:3.4	0.29
ADULTS	8,000	7	560	24	1,920	1:3.4	0.29

Table V

that judgment must be used in interpreting results when using such refined methods in diagnosis.

Turning now to the differentiation between tuberculosis and other diseases in which the monocytes are found increased, let us review the case history of a one year old infant.

Three weeks before entering the hospital he was taken ill with fever, cough and difficult breathing. There was no history of exposure to tuberculosis and previously he had been regarded as a normal baby. After one week of bronchitis he improved somewhat, but as he continued to refuse food, vomit, lose in weight and become pale, he was referred to the hospital by his family physician. When examined he appeared to be severely ill, lying quietly on the bed, with rapid and shallow respirations, dilatation of the alae nasi, an expiratory grunt and deep cyanosis. The temperature was 101.4° F. with rales scattered throughout both lungs. The spleen was palpable. A diagnosis was made of diffuse bronchopneumonia, tuberculosis to be excluded. The roentgenologist reported: "A generalized fine speckling of the entire lung fields, characteristic of tuberculosis." The tuberculin reaction (0.1 mg.) was negative. Keeping in mind that the tuberculin reaction may be negative in acute tuberculosis and having before us the evidences of the roentgenogram, a supravital stain of the blood was made. The total number of white blood cells was 18,000 per cu. mm. Sixty per cent were polymorphonuclear neutrophils, 28 per cent were lymphocytes, and 12 per cent were monocytes. There was a high monocyte-lymphocyte ratio, namely, 1:2.5. The absence of modified monocytes and epithelioid cells even with the increased monocyte-lymphocyte ratio overruled the evidence given by the roentgenogram and supported the diagnosis of primary pneumonia. The baby made an uneventful recovery.

It is known that a monocytosis may occur in conditions other than tuberculosis. Hickling[10] has shown that an increase in the monocytes develops in the circulating blood in pneumonia. Jones and Minot[11] have called attention to similar changes in infectious (catarrhal) jaundice, and Sabin[3] has reported an increase in the number of circulating monocytes in Malta fever. Cunningham and Tompkins[8] mention that in some diseases and conditions in which there is involvement of the liver, as may arise from toxins or chemicals, the blood may show changes suggestive of those found in tuberculosis. Among other conditions requiring differentiation from tuberculosis are subacute bacterial endocarditis, infectious mononucleosis and Hodgkins' disease. Here much confusion often arises, but, as will be remembered, the cell type is very different from those which are characteristic of the disease under discussion. We have found an increased number of monocytes in patients with acrodynia, congenital syphilis, acute and chronic non-tuberculous pneumonia and infectious jaundice. In these cases, although the monocytes have been increased in number, thus changing the monocyte-lymphocyte ratio, the absolute number of lymphocytes was not decreased and epithelioid cells could not be demonstrated. Promptness in diagnosing tuberculosis has been facilitated by the supravital stain. This method has proven helpful to us in differentiating tuberculosis from epidemic encephalitis, anterior poliomyelitis, malignant new growths and infectious mononucleosis. It appears that the chief differentiating point in the blood picture between tuberculosis and other disease processes in which the monocytes are increased is the demonstration of modified monocytes and epithelioid cells by the supravital stain.

As to prognosis, no doubt you have gathered that the changing blood picture can be used as an index as to the degree of activity of the tuberculous process. In our cases, when the infection was rapidly advancing, the monocyte-lymphocyte ratio was increased and modified monocytes and epithelioid cells were demonstrated in the peripheral blood stream. A decrease and finally a reversal of the monocyte-lymphocyte ratio and the absence of epithelioid cells denoted a healing or quiescent process. During healing we have observed a rapid outpouring of young lymphocytes with a monocyte-lymphocyte ratio far in excess of the normal. The blood findings in a little girl of six years with tuberculous peritonitis, as graphically pictured, will serve as an illustration of the changes during the active and healing stages (*Chart 4*).

In conclusion, we believe that in infants and

young children the degree of activity of the tuberculous process, or in other words the resistance of the patient to the tubercle bacillus, may be determined by the ratio of monocytes to lymphocytes and by the appearance or absence of epithelioid cells in the circulating blood. Furthermore, such changes are of diagnostic and prognostic value; also they are useful in differential diagnosis and may be taken as a guide in advising treatment in this protean disease.

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INDICATIONS FOR SURGERY IN PULMONARY TUBERCULOSIS*

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Dr. John Alexander states in his book, "Surgery in Tuberculosis:"

"It is perhaps not realized by some surgeons and internists that surgery is now curing or improving approximately two-thirds of those selected cases of advanced tuberculosis that other methods of treatment have failed to benefit."

As I have but twenty minutes at my disposal, I can touch upon only the more important points of this subject and those that it seems wise to stress particularly.

I do not think that there is any field in medicine or surgery where the two major sections of practice come more closely together and where it is more important that there should be cooperation between the surgeon on the one hand and the medical man on the other. The surgeon who expects to do chest surgery should have far more than the ordinary surgeon's knowledge of pulmonary mechanics and of those conditions in the chest produced by disease, and the internist should have a working idea of the various operative procedures that can be permitted, of their relative severity, and also of the result that can in all sincerity be predicted for the patient about to undergo surgical interference.

Now we come to the last topic of this discussion, namely the indications for surgery in pulmonary tuberculosis. To begin with we will have to change this heading a little and call it the indications for collapse therapy in pulmonary tuberculosis, because while artificial pneumothorax is not usually included under the head of surgery, it plays such an important part in, and is, as it were, so much the father, of all collapse therapy that it cannot be left out of the discussion. What, therefore, are the indications for collapse therapy in pulmonary tuberculosis?

First, chronic, productive, fibroid cases with or without cavity formation that are mostly unilateral or in which the contralateral lung is free from activity. These cases are the best types for surgical intervention of whatever nature it may be.

Second, exudative cases, the highly febrile, rapidly spreading cases with marked toxicity. These cases, however, do not respond to surgery as well as the fibroid cases, although they may respond well to the process of artificial pneumothorax if it can be successfully induced.

Third, profuse hemoptysis. In these cases artificial pneumothorax will be the type of surgery resorted to, for in those cases in which it fails profuse bleeding will probably lead to a fatal termination before satisfactory surgical arrangements and operative procedures can be brought about, save in those rare instances where a full operative equipment is maintained in the sanatorium where the patient is ill.

Fourth, tuberculous empyema with mixed infection after attempts at irrigation and aspiration have failed. We all know that these tuberculous empyemata must be kept closed at any cost, and that rib resection and tubal drainage must be absolutely shunned. Some cases can be well treated by aspiration and irrigation. Others, particularly those showing mixed infection, will not yield to these meas-

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ures, but cases can be almost miraculously transformed by successful radical surgical intervention. There certainly are many other indications for surgery in pulmonary tuberculosis, but in covering the subject in a brief time I can touch only upon the high places.

We have dealt with indications only in so far as the diseased lung is concerned. In reaching a decision as to whether surgery, of whatever nature, is indicated or not, we must understand, however, that the contralateral lung is quite as important as the diseased lung. Whether the procedure contemplated is as simple a proposition as the attempted induction of an artificial pneumothorax or as serious a proposition as a paravertebral extrapleural thoracoplasty, the condition of the contralateral lung is always of paramount importance. It is common knowledge that anatomical unilateral pulmonary tuberculosis is a great rarity, so one must not expect that in any large number of cases one lung will be found absolutely free from disease. The question is not whether the contralateral lung is free from disease, but what amount of disease exists in that lung, and whether this disease is active or inactive. The determination of the amount of disease is relatively simple. The determination of degree of activity of disease is by no means simple and often requires several weeks or months of careful observation, repeated examinations, and serial x-ray pictures to determine whether the process in the contralateral lung shows progression or retrogression. If, after careful observation, the process shows progression, then all types of surgery on the badly diseased lung are absolutely contra-indicated. If, however, the process in the contralateral lung remains stationary or shows a tendency to retrogression and fibrosis, one can very well proceed with radical surgery on the bad lung. I was very much impressed during a recent visit to Portland, Oregon, where I visited the Clinic of Drs. Matson, Matson and Bisaillion to see the good results obtained by pneumothorax and also by more radical lung surgery in patients that had a large percentage of involvement in the contralateral lung. Eighty per cent of their patients are stage 3 cases and come to them at a time when something definite must be done, and when the ordinary rest cure is no longer sufficient. What I saw there with my own eyes convinced me beyond a doubt that the patient can get along with much involvement in the contralateral lung and withstand operative procedures on the more diseased lung, provided the lesions in the contralateral lung are showing a tendency to fibrosis rather than to further spread. A large percentage of those cases requiring more radical lung surgery will come under the heading of cases in which artificial pneumothorax has been tried and has been only partially successful, checking the disease to a certain point, but by no means obliterating all the foci of infection.

I have not referred hitherto to the question of cavity formation, but of course we all realize in dealing with these cases that there will necessarily be cavity formation in a large number. In many instances the presence of cavities will be the determined factor in deciding upon lung surgery. Time and again cases of artificial pneumothorax will be partially successful, resulting in the compression of all that portion of the lung which has been infiltrated by the diseased process, but not resulting in the compression of the cavity, in other words of the most destructive portion of the lesion, because of adhesions which hold it out very much as the strands of the spider's web hold that web out and prevent its collapse. The presence of a cavity always denotes a destructive lesion and unless the walls be definitely thick and fibrous, and unless the amount of secretion from the cavity be very scant or nil, we must always be wary because we have in our patient the potential sources of serious trouble. Also as long as a cavity exists there is the danger of possible hemorrhage from one of the vessels in its wall. When, therefore, a cavity is present which cannot be compressed by means of artificial pneumothorax, when the patient continues to have secretion from the cavity walls and the sputum keeps coming, whether or not there is at times streaking, the patient is in danger and some other form of surgical intervention should be considered, for the time is past now when the failure of an artificial pneumothorax leaves us powerless as far as any further therapeutic measures are concerned.

There are several surgical procedures which can be mentioned having as their primary object the compression of cavity and thereby the elimination of its dangers. The first is known as open pneumolysis in which a rib or two is resected over the cavity and continuous pressure exerted mechanically, either by the introduction of gauze pads, paraffin or fat. The second procedure, which is called closed pneumolysis, is applicable only in those cases of artificial pneumothorax which have been but partially successful. This operation consists in the cauterization of the narrow bands of adhesions which

prevent the cavity from compressing. The originator of the operation was Dr. Jacobaeus, of Sweden, who devised the instrument consisting in the first place of a thoracoscope which is comparable to a cystoscope, and a cautery which is inserted through a different opening in the chest, the adhesions being cauterized visually, the eye of the operator looking through the thoracoscope while the hand of the same operator manipulates the cautery. The man in this Country who has been most successful in this procedure is Dr. Ralph C. Matson, of Portland, Oregon. I have seen Dr. Matson do this operation several times and have looked through the thoracoscope and seen the very severance of the adhesion. It is a delicate procedure and must be undertaken only by a thoroughly qualified individual. It is by no means a procedure to be contemplated by the average man.

The third procedure is known as phrenicotomy, or preferably as phrenico-exairesis, whereby the phrenic nerve is cut and then the distal portion is avulsed from its termination in the diaphragm. The advantage of phrenico-exairesis over phrenicotomy is that in the latter operation the accessory phrenic nerves are eliminated and definite and permanent diaphragmatic paralysis is bound to result. The main object of phrenico-exairesis is of course paralysis of the corresponding leaf of the diaphragm. When this occurs the diaphragmatic dome rises considerably, anywhere from three to eleven centimeters, and, in a successful case, an amount of compression is obtained equivalent to about one-third of a complete pneumothorax. Naturally, no one can tell at the start how much compression will be obtained in any given case. Phrenico-exairesis may be termed the half-way house of pulmonary surgery. In cases whose lesions are in the upper lobe this procedure will exert the least amount of influence; whereas, conversely, where lesions are in the lower lobe the greatest amount of beneficial effect will be shown. It happens at times, however, that despite the location of the lesion, whether apical, mesial or basal, the effect of phrenico-exairesis is so satisfactory that no further procedure need be entertained. Nevertheless, no patient should be led to believe that he is going to obtain a perfectly satisfactory result from the phrenic nerve operation alone. Far more frequently will this have to be followed by the more radical and extensive operation of total or partial thoracoplasty.

Finally, we come to the operation of extrapleural paravertebral thoracoplasty, with which I shall deal hardly at all, as my colleague, Dr. Herbert, is going to take that up *in extenso* very soon. This is the most radical procedure, consisting of the removal of all or any number of the ribs on the affected side, allowing the lung underneath them to collapse and thus also forcing the obliteration of cavities which may exist. Most satisfactory results are to be expected from this operation which, with growing experience, with more consideration for the patient and with the better understanding of pulmonary mechanics, is by no means today the desperate procedure that it was some years ago.

In closing I wish to read a quotation from Dr. Alexander's book about the indications for thoracoplasty, which is so comprehensive that it should be well known to every medical and surgical practitioner:

"Thoracoplasty is definitely indicated for those patients who are in good general clinical condition and who have clinically one-sided, chronic, advanced, fibrous, cavernous or non-cavernous tuberculosis without complications, which has failed to respond to a sufficiently long sanatorium regime and a combination of phrenicotomy and attempted artificial pneumothorax."

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DIAGNOSIS OF CHILD TUBERCULOSIS*

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The history of tuberculosis is that of an endemic devastating plague. Its path was marked for many years by a sharp rising curve, then a period of relative evenness, followed eventually by a slow and steady decline as education and sanatorium treatment seemed to affect the control. Wherever tuberculosis has invaded virgin soil as in primitive tribes, there has invariably been a marked exacerbation; and infants and children are generally susceptible victims. The period of invalidism incident to tuberculosis is protracted, and if the disease has reached a certain stage before treatment is instituted, death is inevitable. In active cases which have been diagnosed early and through intelligent care have become "arrested," the individual is always restricted in activity and handicapped in all vocational pursuits to a serious degree, having to take care of himself with extreme caution the rest of his life.

It is usually presumed that when the specific

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cause of any infectious disease is discovered a cure or preventive inoculation or both are soon to follow. The Koch bacillus was proved to be the cause of tuberculosis nearly fifty years ago, and yet up to date no specific cure or preventive has appeared; nothing can be done by way of treatment except through general measures. The sanitary handling of tuberculosis and the education of the public in the manner of transmission of the disease have undoubtedly reduced the mortality and possibly even the morbidity to an appreciable extent, so that in late years both have been shown to follow a gradually falling curve and some have been bold enough to predict that tuberculosis will be stamped out in the near future. A careful study of statistical data at our command and an appreciation of all the factors involved raises the question in the minds of some of us whether an irreducible minimum has not been reached through the present methods of study and control. One of our outstanding health commissioners has laconically remarked that no infectious disease was ever controlled by merely taking care of those affected. The problem would appear to resolve itself naturally into two phases, prevention and cure. We have already seen that there is no known cure and until some means of preventive inoculation which can be applied to all young children is devised we have nothing to hope for from this source. The world is anxiously awaiting the results of extensive experiments with Calmette's prophylactic administrations. Prevention at present is limited to the diagnosis of advanced cases and those of moderate severity and the removal of susceptibles from the tuberculous milieu.

We are accustomed to classify tuberculosis clinically into (a) incipient; (b) moderately advanced; and (c) advanced cases. The diagnosis of the last two classes is comparatively easy. Incipient tuberculosis is to be found only in childhood and constitutes a difficult diagnostic problem. It is quite generally accepted today that a large proportion of individuals can be shown to have had "tuberculous infection" by the time adult life is reached. Tuberculous infection does not mean tuberculosis, but does mean that there is a focus, in many instances undiscoverable, somewhere in the body. An individual once acquiring the focus of infection, unless carefully watched, is apt to develop a frank case of tuberculosis at a later period. All children, especially those in the first few years of life, are peculiarly susceptible to tuberculous infection and the number of deaths from tuberculosis in early life is relatively large. Many children are found to be suffering from destructive processes in the lungs and usually succumb rapidly to massive infection. A very much larger number of children, however, are found suffering from tuberculous infection without demonstrable lesions. Tuberculous infection in children is essentially one of the lymph glands and we may safely say that the term "incipient tuberculosis" should be limited to infection of the tracheo-bronchial glands, to which the term child or puerile tuberculosis is usually applied. In this paper, only this type of infection is considered and the means of diagnosing it are discussed.

The diagnosis of child tuberculous infections of the tracheo-bronchial glands can be made only along several sharply defined lines as follows: (1) the history of contacts; (2) the past history of the child; (3) the state of nutrition; (4) an intradermal tuberculin test; (5) the x-ray.

(1) *The History of Contacts.*—It has been shown by several observers, notably Opie, Rathburn, Lyman and others, that casual exposure rarely produces tuberculous infection in young children, but that prolonged contact with some member of the household, in most instances one of the parents of the child or some other adult member of the household, is the usual source of infection. Many elderly individuals are the subjects of chronic productive coughs which are diagnosed "chronic bronchitis of the aged." A large proportion of these will be found to have tuberculosis. Servants are not infrequently the disseminators of the disease. It is a striking fact that in many instances the individual harboring the infection may not be aware that he has ever had an infection; but wherever opportunity has presented to make a careful study of the conditions in the home from which a tuberculous child has come, a source of infection has invariably been found. In many respects the discovery of such contacts constitutes our very best method of control of this disease. This phase of the problem is one which concerns largely public health officials and child welfare agencies, and on them we must depend for success. The family physician, however, is in intimate frequent contact with people in their homes and it should be his constant care to discover all suspicious cases and see to it that other members of the family are carefully examined, and all children protected.

(2) *The Past History of the Child.*—I cannot stress too strongly that children infected with

tuberculosis may be and frequently are entirely symptomless. On the other hand, there are a number of symptoms which are supposed to be at least suggestive of tuberculosis in children. Among them may be mentioned: the child is easily fatigued; there is a lack of desire to play or study; the child is incapable of sustained exertion; or there is frequently observed slight or excessive perspiration and quite frequently the child's skin is cold and clammy. To the writer's mind none of these is characteristic, all of them being present in the malnourished child, but any one or all of them should arouse suspicion and inspire a complete physical examination. Loss of appetite may or may not be manifest, but one symptom I think should be regarded with grave suspicion if not as almost pathognomonic, and that is a uniform daily afternoon rise of temperature and a morning temperature which is slightly subnormal. To be sure, we must with reasonable assurance rule out other infections, but it is very rare, if indeed it ever occurs, that chronic low grade infections produce an afternoon moderate rise of temperature and a morning temperature which is subnormal. In many instances a family physician who is observing and who has watched a child manifesting general symptoms such as are described in this paragraph over a long period is often led to the diagnosis of tuberculosis without the aid of positive laboratory tests.

(3) *The State of Nutrition.*—One would naturally presume that there would be a definite relation between the state of nutrition and even a low grade tuberculous infection. Such is not the case. To be sure, a child who is habitually underweight should be suspected of tuberculosis until such diagnosis is disproved and also a tuberculous child is apt to be slightly or markedly underweight, but we cannot emphasize too strongly that a very large number of children showing tracheo-bronchial gland tuberculosis carry a normal weight for their height and not a few are definitely above normal. I cannot speak with authority on the next point, because I do not believe sufficient data are at hand from which to draw conclusions, but I have been told by some of my friends who conduct clinics for tuberculous children that the colored child usually weighs more than the white child for an apparently equal amount of infection.

(4) *Tuberculin Test.*—The Mantoux intradermal tuberculin test alone is considered. This test is probably as nearly a specific test as any laboratory procedure at our command. During the first two years of life a positive intradermal reaction indicates active tuberculosis. At any other time during childhood it may mean merely the presence in the body of a past tuberculous infection. It is well known that certain acute infections, especially those producing elevation of temperature, may negative what would otherwise be a positive reaction. It is also recognized that the test is often negative in an infected case during convalescence from several of the specific infectious diseases. The tuberculin solution may be old and may cause an erroneous reading, and it is the belief of the speaker that there are occasional instances of tuberculous infection in which the tuberculin test is persistently negative, though such instances are undoubtedly rare. One must be sure the technic is correct in every detail. It is to be hoped that the monocyte test of Blackfan will prove to be of the greatest value.

(5) *X-Ray Plates.*—Roentgenograms of the chests of children have proved of the greatest benefit. Considerable experience in the interpretation of such plates is necessary for accurate deductions, and the closest cooperation should exist between the roentgenologist and the clinician. In fact, the clinician must finally be the one to interpret the x-ray findings in the light of his physical examination. Peribronchial thickening, indicating some form of gland involvement, is familiar to all. This is not conclusive evidence of tuberculous infection. The presence of a small number of glands showing calcareous deposits, if limited to the area known as the first zone, is not necessarily conclusive evidence; nor is it always conclusive if an occasional calcareous gland is found in the second zone, because chronic non-tuberculous infections of the bronchial tree can cause deposition of lime salts in these glands. It would be very unwise to interpret as tuberculous infection of the tracheo-bronchial glands any roentgenogram taken within six months of severe bronchitis, measles, broncho-pneumonia or whooping-cough. When infiltrated glands are found in the third zone (glands in the third zone are not considered bronchial), and especially where calcareous glands, however few, are found in this zone, a tuberculous infection should at least be suspected. When such findings are accompanied by radiating lines approaching the periphery of the lung, a tuberculous infection may be presumed to exist. We must not lose sight of the fact that the younger the child the more apt the infection is to be found in the upper part of the lower lobes or lower part of the upper

lobes and rarely in the apices as in adults. When tracheo-bronchial gland involvement is demonstrated by the x-ray in the third zone, we should make a tentative diagnosis of tuberculous infection with or without a positive skin test. Where the infiltration involves the glands of the second zone in the presence of a positive intradermal test, a definite diagnosis of tuberculous infection may safely be made. Caseo-calcareous glands in any part of the chest are regarded as definite evidence of tuberculous involvement.

It may seem strange to some that the question of diagnosis through physical examination alone has so far been ignored. I think it quite safe to assert that tracheo-bronchial gland tuberculosis in children, that is, "child tuberculosis," cannot be diagnosed by chest examination alone. Percussion rarely elicits dullness, except occasionally along the spine, and this is usually so slight that few can interpret it. There is rarely any change in the breath sounds: and d'Espine's sign, if present, merely indicates some post-tracheal gland enlargement and is not diagnostic of tuberculosis. I admit that this sign is of little benefit to me.

The location of the primary focus has been a subject of debate. Ghon taught and apparently proved that the infection began in the glands near the tracheal bifurcation, having passed from the trachea or beginning bronchial tree, and then spread to the glands along the bronchial tree, that is, it became peribronchial. Recently it has been thought (Miller) that the infection began in the lung tissue far out toward the periphery and worked inward along the bronchial glands. To the writer's mind it would appear that Ghon's argument is the more logical, though it must be admitted that evidence for the other theory is not altogether lacking.

It seems to the author, therefore, that if we are to control the spread of tuberculosis and to prevent its occurrence or outbreak in young adults, the only satisfactory method appearing at the present moment is as follows: that every school child and, as far as possible, every preschool child, should have an intradermal test performed. Where a single test is negative two subsequent tests with increasing strength of solution should be made forty-eight hours apart. All children found reacting positively to this test should then have a stereoscopic x-ray of their chest made; the family from which they came should be investigated thoroughly, and the children themselves placed under the strictest supervision and a record kept of them.

DISCUSSION (*Abstract*)

Dr. Wm. A. Mulherin, Augusta, Ga.—Dr. Royster's definition, as you noted in his paper, gives incipient child tuberculosis and tuberculosis of the tracheobronchial glands as synonyms. He does not include in his consideration advanced or moderately advanced tuberculosis, nor tuberculosis of the tracheobronchial glands where these are enlarged enough to produce pressure symptoms; but that type of case in which a positive diagnosis is difficult. The child is not thriving, has no appetite, cannot stand sustained exertion. I have found fever a little irregular. Examination will show nothing conclusive. The x-ray may show slight enlargement of the tracheobronchial glands.

The distinction between tuberculous infection and tuberculous disease is like that between hookworm infection and hookworm disease. Hookworm infection, we know, is common; hookworm disease less frequent; tuberculous infection is widespread, while tuberculous disease occurs less often.

Much unnecessary alarm may be caused by telling the mother the child has tuberculosis after a positive intradermal tuberculin test, without making it clear that it is a potential case and not the acute disease. If the child lowers its vital force very decidedly even later in life by too much study, too little sleep, a little drinking, or something of that kind, the disease will come up.

We have a responsibility, not only to make the diagnosis of tuberculosis in the child, but to ferret out the focus of infection, for the good of the rest of the family and for the good of the community. Down in the South the mammy is a frequent source of infection, either of tuberculosis or venereal disease.

The x-ray and the intradermal test go hand in hand in diagnosis.

Dr. Wilburt C. Davison, Durham, N. C.—If a diagnosis of incipient childhood tuberculosis or tracheobronchial-gland tuberculosis is made, much can be done to prevent the further development of the disease in the patient and the spread of the infection to others. In taking the history of any child an effort should be made to learn if anyone of the family or any of the contacts has a cough. One should not be deluded by the frequent statement that, although the father has a cough, it is merely a "cigarette cough." A so-called cigarette cough is often mild tuberculosis and should call for a thorough physical examination. Investigation of the environmental conditions is an important factor in the prevention of tuberculosis in children.

Dr. John Zahorsky, St. Louis, Mo.—Nowadays in cities the family has no family physician. The pediatrician is called in after the baby is born and takes care of the children, and the rest of the family get along without any family physician or by only occasionally consulting an internist. When I am called to take care of a baby I like to know something about the rest of the family. I ask the mother if there is any tuberculosis in the family or any lung trouble. Usually the mother denies it indignantly. In one family, for instance, a child I had taken care of for several years developed tuberculous meningitis; and it was only by the most exacting methods, in fact, by actually examining the members of the family myself, that I found the grandmother had tuberculosis. This is a most difficult task and requires methods we do not ordinarily employ. I must admit that half a dozen or more babies have died of tuberculosis under my care, the symptoms coming on unexpectedly. Later I have found

that some one in the family had tuberculosis. If some one can find out a method by which the pediatrician can become thoroughly acquainted with the rest of the family I shall be very grateful.

Dr. Philip F. Barbour, Louisville, Ky.—Baumgarten, many years ago, said that practically always tuberculosis in the adult is a re-awakening of infection acquired in childhood. Today we realize that tuberculosis is really a childhood disease, and when it occurs in adults it is usually a lighting up of an old focus.

I know of nothing in which we are more grateful for help than in the diagnosis of incipient tuberculosis. We have leaned upon the x-ray and often have found it a broken reed. Dr. Blackfan has written of another laboratory method which should be of great help. But, after all, the responsibility is upon us to make the diagnosis outside of the laboratory and the radiological findings. I think it is not very difficult to make out a widened tracheobronchial area by percussion. I like, however, to have these cases x-rayed and to have them x-rayed again after a period of time. One x-ray does not give you as much information as a radiogram taken now and a radiogram taken six months or a year afterwards. You can check up what you have found and can show your patient a year afterward whether it is progressing or has regressed.

I think Dr. Royster hardly gave sufficient attention to some of the other conditions which will cause fever. While a temperature of 99 to 99.5° is very suggestive of tuberculosis, there are some common types of infection which will give that temperature. Sinus involvement of low grade will give a low grade fever, which will run month after month and which it is very difficult to cure. A number of my cases of this kind have been treated by the nose and throat man and given complete relief.

A source of infection is the teacher in the public school. Recently in Louisville our Health Officer has put in effect regulations which require teachers to have a chest examination, and which exclude cases of tuberculosis from teaching in the public schools. That is a thing which has been neglected in the South and which might be applied through our public schools to advantage.

Dr. John Lovett Morse, Boston, Mass.—We must be careful not to take it for granted that, whenever a child has a continued elevation of temperature, it is tuberculous. In fact, I always take the position that it is not, and try to find some other cause for the rise in temperature. If I cannot, I feel that it is due to tuberculosis. Unfortunately, we do not know what the temperature of the normal child is. It is very difficult to know, therefore, whether the given temperature is normal or not. Furthermore, we do not know whether the morning temperature of the normal child is subnormal, that is, below what we assume to be normal, or not. Consequently, I am a little skeptical that a "subnormal" temperature in the morning means tuberculosis. I believe strongly that continued elevation of temperature in young children is often, if not most often, due to infection of the nasopharynx and neighboring sinuses. Another cause is pyelitis. Still another, which is usually not thought of, is chronic indigestion, most often of the type due to intolerance for starch. Incidentally, I think that this is the only meeting I have ever attended at which the subject of tuberculosis in childhood was discussed, but the necessity of boiling or pasteurizing the milk supply was not brought up and everything else except the possibility of infection through milk forgotten.

Dr. Royster (closing).—I do not think that I said that the peculiar type of temperature I spoke of was pathognomonic, nor do I; but it is suggestive. In the affections of which Dr. Morse spoke there is a rise, but in the cases in which I have had the opportunity to follow it out there has not been subnormal temperature in the morning.

Every child infected with tuberculosis is a potential frank, open case of early adult life. Therefore, every child infected should be watched. Let me bring out one point there. The child should be watched without his knowing it. With every mother in the land being taught to do this and that and every physician in the land laying out rules for the child to follow, the child has not an hour to do anything except follow some rule.

The old mammy infection is very important to bring out, but I wish to mention also the Abyssinian flapper. If there is any way to get the old mammy to be examined, I wish you would let me know what it is.

THE ABDOMINAL REFLEXES*

By CHARLES M. BYRNES, M.D.,
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A light stroke upon the skin of the abdominal wall usually elicits an immediate single contraction of certain of the abdominal muscles, and this response, generally known as the abdominal reflex, is confined ordinarily to that side of the abdomen to which the stimulus is applied.

The absence of this reaction was first described by Rosenbach[1] when he failed to obtain the reflex on the paretic side in the apoplectic hemiplegias. Jastrowitz had previously noted loss of the cremasteric reflex in hemiplegia of similar origin, but incorrectly attributed its absence to paralysis of the abdominal muscles. Rosenbach was of the opinion, however, that the absence of both of these reflexes is, under these conditions, due to the cerebral lesion alone and dependent upon interruption of the cortico-spinal fibres. This opinion has been confirmed by his later studies[2] and those of many subsequent investigators.

For a number of years loss of the abdominal reflex was regarded as merely an interesting additional sign in the reflex disorders of the hemiplegic, and not until Strumpell directed attention to its early abolition in disseminated sclerosis did it come to occupy a prominent place in neurological diagnosis. The apparent increased incidence of this disease in America within the past fifteen years and the contradictory teachings concerning the abdominal reflex seem to

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warrant a consideration of the methods of eliciting it, the nature of the reflex, and the various disorders in which its abolition is said to be of clinical importance.

Little knowledge of this character is to be found, however, in modern text-books in the French, German, or English languages. Definition of the reflex is often disposed of in a few words as:

"A contraction of the muscles of the abdominal wall when the skin over the side of the abdomen is stroked;" a rapid contraction of the muscles of the belly wall by "irritation of the lateral regions of the abdomen"; or, with the patient in the recumbent position "stroke the skin of the abdomen"; and in one instance it is incorrectly stated that "a tap on the costal cartilages on either side of the xyphoid depression causes a dimpling or lateral movement at this point called the epigastric reflex. A similar tap on the costal border in the nipple line produces the abdominal reflex."

The directions for eliciting the abdominal reflexes are no more explicit. "Stroke the skin of the abdomen," "irritate the lateral regions of the abdomen," or "stroke the breast" are common descriptive terms. Others state that the epigastric reflex is obtained by stroking the skin along the costal margin, or parallel to the midline above the umbilicus, or in the mammillary line from the fifth rib to the costal border. Stroking the skin below the umbilicus and parallel to the outer border of the rectus is said to elicit the abdominal reflex. With the patient in the prone position it is advised that the stroke be directed either perpendicular or parallel to the midline. The end of the reflex hammer, a match stick, a needle, or a piece of ice might be used, and in case these methods are ineffectual they might be repeated with the patient standing erect. The upper and lower abdominal reflexes are, according to others, elicited by irritating the skin on each side of the umbilicus and in the inguino-abdominal regions, respectively; or, still more indefinitely, by stroking the skin between the costal border and the inguinal canal.

One might well ask, then, what are the abdominal reflexes and how are they to be elicited? Reflex contraction of the abdominal muscles might be evoked in two ways: first, by a light stroke or other forms of irritation of the skin of the abdomen; and, secondly, by percussion over certain bony prominences or tendinous attachments of the abdominal muscles. Only those elicited by the first method are, strictly speaking, true abdominal reflexes. Those obtained by percussion are known as the deep, periosteal or tendinous reflexes and have not the same significance as those obtained from the cutaneous surface.

Although the abdominal reflex might be elicited from almost any portion of the abdominal wall, stroking of certain regions will often evoke a response more or less restricted to the stimulated area. Thus, the surface of the abdomen has been divided into a number of reflexogenous zones, the designations of which are quite as numerous and confusing as are the methods of eliciting the reflex. Rosenbach refers merely to an upper and lower abdominal reflex, the supra- and infra-umbilical reflexes of Oppenheim,[3] but epigastric, mesogastric and hypogastric reflexes are described by Schuster,[4] while others write of superior, middle and inferior abdominal reflexes according to the classification of Van Gehuchten.[5] A median and an inguinal abdominal reflex have also been described. There are, furthermore, conflicting designations of the epigastric, the median, the hypogastric, and the inguinal or oblique reflexes.

It seems, therefore, that the abdominal field has been too productive of reflexogenous zones and one begins to question the necessity of this minute subdivision of a field in which a single stroke from the costal margin to the inguinal region is productive of muscle contraction which might well be designated as the abdominal reflex. That a restricted division of this extensive skin surface into regional zones is of use in clinical medicine, rests upon the observation that in certain conditions the reflex might be lost in a portion of the field, but readily elicited elsewhere.

A simple and therefore useful designation of these zones is found in the comprehensive studies of Soderbergh,[6] who divides the abdominal surface into four regions from which segmental reflexes may be elicited. Three horizontal lines are drawn across the surface of the abdomen. The first, at the level of the tip of the ensiform cartilage; the second, at the level of the infracostal margin; and the third, one inch above the iliac crests. By appropriate stimulation there is obtained a dimpling of the central region about the xyphoid cartilage. This is the median abdominal reflex of Soderbergh and the epigastric reflex of other writers. Below the xyphoid cartilage there are three zones on each side of the midline from which are elicited the superior (supra-umbilical), middle (mesogastric), and inferior (infra-umbilical) abdominal reflexes. If one strokes the inner side of the thigh there is obtained in man not only a retraction of the testicle, but a contraction of the lowermost fibers of the internal oblique muscle of the abdomen. This so-called hypogastric reflex of Bechterew or inguinal reflex of Giegel was, at one time, regarded as entirely a cremasteric response, but occurrence of the abdominal component in woman established its identity as a distinct ab-

dominal reflex independent of the accessory cremasteric contraction.

Of the deep abdominal reflexes, the one evoked by a sharp tap with the percussion hammer over the lower costal margin appears to be most generally employed, but, at the same time, most often mistaken for a true epigastric skin reflex. Very recently Guillain and Alajouanine[7] have described a mediopubic reflex elicited by percussion over the symphysis pubis, and Galant[8] evokes a similar response by a tap upon the iliac spine. This he designates as the spino-iliac reflex. Trioumphoff[9] obtains contraction of the abdominal muscles by percussing in the region of the pubic tubercle from 1.5 to 2 cm. to either side of the symphysis. These tendon and periosteal reflexes are often present or even exaggerated when the cutaneous reflexes are lost, but their further discussion and clinical significance do not, strictly speaking, form a part of this discourse.

Although numerous methods of cutaneous irritation have been recommended for eliciting the abdominal reflex, it seems that some form of stroking is the one most widely adopted; but the direction of the stroke is as varied as the objects with which the stroke is made. Rosenbach stroked the epigastrium either transversely or parallel to the midline, but remarked that the direction of the stroke is most indifferent. He not infrequently obtained a more widespread contraction by stroking lightly over the inguinal canal, or over the lateral abdominal wall along the course of the lower intercostal nerves. When these methods failed the reflex was often obtained by sudden application of the cold metallic part of the hammer to the exits of the anterior abdominal nerves, or by use of the electric pencil. Soderbergh, with the patient in the recumbent position, makes the stroke with a dull instrument, transversely in the middle zone, and obliquely in the superior and inferior lateral zones. Drinkler, however, strokes the skin of the abdomen along the course of the abdominal nerves from the spine to the midline in the several segmental regions.

The normal cutaneous abdominal reflex is, according to Monrad-Krohn,[10] obtained only by stroking, but he refers to no specific method or direction. Goldflam,[11] however, attaches much importance to the technic of examination, and advises that the stroking be done with the finger, the end of the reflex hammer, or a blunt pencil. These are drawn rapidly across or vertically along the abdominal wall, and if the reflex is feeble or unobservable when tested by this method it might become apparent by using the sharp point of a needle, or else be detected by palpating the abdomen at the time the stroke is made. Inhibition on the part of the patient is rarely overcome, but more often augmented by practicing the Jendrassik method of reinforcement. Pinching the skin and other painful stimuli are, likewise, of no additional value.

Although I have experimented with many of the various forms of peripheral irritation, I have found none more reliable than stroking the abdominal surface with the end of a match stick. It is essential, however, that the confidence of the patient be secured; that the abdominal muscles be moderately relaxed; and that the patient's attention be diverted. A good light is also necessary. If, under these conditions, the reflex is not elicited, use of the electric pencil will usually revoke a response. The faradic current as a means of stimulation has been extensively used by Stern-Piper.[12] With a barely perceptible current, the indifferent electrode is placed over the sternum and the stimulating pencil stroked lightly along the abdominal wall. I have found this method particularly useful for obtaining the reflex in the fat, pendulous abdomen, in the relaxed abdominal wall of the multipara, and in the apparently normal individual when other methods have failed. If, however, the reflex is actually abolished from interruption of the reflex arc electrical stimulation has not, in my experience, elicited a response. In the diagramatic sketch of the abdomen (*Fig. 1*) I have represented the more important reflexogenous zones as suggested by Soderbergh and indicated also the direction of the stroke and type of response to be elicited from each domain.

Since it is thus possible to recognize clinically a number of zones in the abdominal field from any one of which the reflex might be lost while obtained in others, it is important to know something of the spinal segments related to these subdivisions. Obviously the innervation of the entire abdominal wall has a wide representation in the spinal cord, and it is said to extend from the fourth thoracic to the first lumbar, inclusive. Oppenheim, however, places the upper level at the seventh thoracic and the lower limit at the twelfth; and although Gowers,[13] Schuster, and Church and Peterson[14] find it as high as the fourth thoracic level, Soderbergh, after searching investigation, found it no higher than the sixth. There is also some difference of opinion as to the spinal localization of the individual zones.

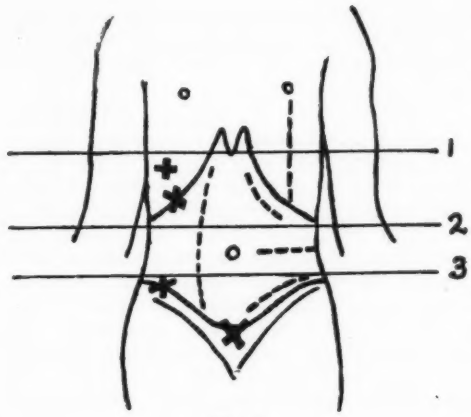

Fig. 1

Diagram of reflexogenous zones and direction of stroke in eliciting the abdominal reflexes. 1. Xyphoid line. A vertical stroke in mammillary line causes dimpling of epigastric region—the epigastric or median reflex. 2. Infracostal line. 3. Iliac line. Between these lines each lateral half of the abdomen is divided into three zones with the direction of the stroke indicated by the dotted lines. The superior (supraumbilical), middle (mesogastric), and inferior (infraumbilical) reflexes are in their respective zones. The dotted line on the left indicates the stroke for stimulating all three zones. The percussion points for the deep reflexes indicated by the crosses.

Soderbergh, in one of his earlier studies, stated that he was unable to determine the segments for the epigastric reflex, but in a later paper, quoted by Galant, he places it from the sixth to the ninth thoracic. Gowers and others locate it from the fourth to the seventh, inclusive; but none find it lower than the ninth. The superior reflex is, in all probability, concerned in the lower of these segments. The mesogastric or middle abdominal reflex is generally said to extend from the eighth to the tenth thoracic levels, inclusive, with perhaps slight overlap into the seventh and eleventh segments; while the lower or inferior reflex center includes the tenth, eleventh and twelfth thoracic segments, with probable participation of the first lumbar.

Evidence of the nature of the abdominal reflex, its connection with the cortico-spinal system, and its analogy to the cremasteric and plantar reflexes is found not only in its alteration consequent upon disease of the pyramidal fibers, but in its evolution and behavior under certain conditions in the normal individual. Thus, Bychowski, according to Lewandowsky,[15] failed to elicit it in the new-born, and Astwazaturow[16] states that it does not make its appearance until about the eighth month. Purves-Stewart holds a similar opinion, and Monrad-Krohn found it inconstant in children under one year of age. It is during this period that plantar stimulation evokes, in the normal child, a dorsal movement of the great toe, and a reversion to this type of response is found also in the adult with interruption of the cortico-spinal pathway, since a positive Babinski toe reflex is usually associated with loss of the abdominal reflex. Astwazaturow has, furthermore, observed that in children who, because of some congenital defect or infantile disease, do not acquire complete cortical control the abdominal reflexes never make their appearance. This he considers as evidence of the connection of these reflexes with the cortex or neo-apparatus. These opinions find some contradiction, however, in the studies of de Angelis,[17] who was able to elicit the abdominal reflexes constantly in infants with great ease if the test were made while the child slept or nursed; but he also obtained, upon plantar stimulation, flexion of the great toe in a number of instances.

Examination of the abdominal reflexes in the normal sleeping adult offers many difficulties; and studies of this character have generally been unreliable and contradictory, since an attempt to elicit the reflex almost invariably awakens the subject unless the sleep is profound. Rosenbach and others were unable to obtain the reflex under this condition, and although Goldflam failed to elicit it in a large number of boys in a similar state, he and Bychowsky are of the opinion that it is elicitable except in deep sleep. In artificially induced sleep and in coma of intoxications or brain injury, equally contradictory observations have been recorded. Schuster finds the abdominal reflexes lost early in the course of ether narcosis and for an appreciable period before the tendon reflexes are affected. Bychowsky states, however, that they are completely abolished only during the third stage of the anesthetic. Both he and Goldflam are of the opinion that these reflexes are lost also in profoundly comatose conditions, and the latter regards this sign as of prognostic value since it is thought to indicate the depth of the coma. Crouzon, likewise, considers it indicative of the gravity of the condition. Others maintain that in the coma of diabetes, septicemia and apoplexy the abdominal reflexes are often preserved, but it seems generally agreed that unilateral loss of the reflexes in apoplectic coma furnishes important information for predicting the hemiplegic side when other diagnostic signs are not apparent.

Of the non-nervous conditions in which loss of the abdominal reflexes has been observed,

excessive abdominal fat, relaxation of the abdominal wall consequent upon over-distention from pregnancy, intra-abdominal tumors and ascites, and the hypotonia of the aged are those most generally recognized. In diabetes the abdominal reflexes are occasionally abolished, although the tendon reflexes may not at the time be affected. Williams[18] has studied especially the behavior of these skin reflexes in intra-abdominal disease, and finds them often lost early in the course of typhoid fever. Their reappearance, he states, corresponds very closely with the abatement of symptoms, and is, therefore, suggestive evidence of beginning convalescence. It was also noted that the frequency, degree and duration of their impairment are in direct proportion to the age of the patient. In appendicitis, the inferior abdominal reflex is frequently lost on the right side, but often reappears within twelve to twenty-four hours following appendectomy. Goldflam has also noted frequent abolition of this reflex in appendicitis and considers the sign a valuable means of differentiating this affection from the hysterical abdominalgias.

Exaggeration of the abdominal reflexes is said to be of little clinical value and never indicative of organic disease of the central nervous system. Purves-Stewart, however, finds them hyperactive in conditions associated with hyperesthesia of the abdominal wall and, according to Yoshimura, on the non-paralyzed side in the hemiplegic. Goldflam states that they are occasionally exaggerated in gastric ulcer, and Turner and Stewart find the greatest hyperactivity in the functional neuroses.

In what has been described as inversion of the abdominal reflex it seems that Soderbergh and Monrad-Krohn[19] have used the term in two different senses. The latter found in a case of tumor of the left centrum semi-oviale that the right abdominal reflexes were preserved, while those on the left were abolished. Whereas, in Soderbergh's opinion, inversion of the reflex was noted in a case of hemiplegia in which the abdominal reflex was, as usual, abolished on the paralyzed side, but stimulation of this side evoked a response from the sound half of the abdomen.

The abdominal reflexes are not invariably lost in disease of the cortico-spinal system. Oppenheim states that they are often retained on the paretic side in the infantile hemiplegias, in Jacksonian epilepsy, and in brain tumor with increased intracranial pressure, although the tendon reflexes may, at the time, be greatly exaggerated. Their preservation has also been noted in hemiplegia of a capsular origin where, after having been lost for a time, they may return with increased activity.

Notwithstanding the intimate connection of these skin reflexes with the cortico-spinal system, it is evident that a destructive lesion of the lower thoracic segments or intercostal nerves must of necessity interrupt the peripheral mechanism of this reflex path. Thus, abolition of the abdominal reflexes has been noted in poliomyelitis and in spinal tumor, where their loss might be of localizing value if limited to one of the reflexogenous zones. Ordinarily, they are abolished in complete transverse lesions of the upper cervical cord, but Lewandowsky has met with exceptional instances. Following the induction of spinal anesthesia they are, likewise, temporarily diminished or lost, but soon reappear upon the return of cutaneous sensibility. Their behaviour in the acute and chronic stages of epidemic encephalitis is not constant. They are said to be diminished or absent in about 50 per cent of the cases, and particularly in the acute course of the disease, where I have frequently been unable to elicit them by any of the usual procedures.

Multiple neuritis is, according to Monrad-Krohn, an occasional cause of abolition of the abdominal reflexes, and it is suggested that their absence in chronic alcoholism, as described by Hedde[20] and Goldflam, might be due to neuritis of the abdominal nerves, or to specific changes in the muscles of the abdominal wall. Hedde is of the opinion that loss of these reflexes in chronic alcoholism is helpful in differentiating true tabes from pseudo-tabes alcoholica. Lewandowsky refers to segmental interruption of the reflex from compression of the intercostal nerves in tumors of the skin.

There is much difference of opinion concerning the condition of the abdominal reflexes in tabes dorsalis. Rosenbach, Oppenheim, Ostankow and Schuster find them exaggerated, especially in the early course of the disease, but according to Drinkler and Catola they are diminished or lost on both sides in cases of long standing. This variability is attributed to the irritative and destructive changes occurring in the posterior roots, and Rosenbach is of the opinion that in tabes the activity of these reflexes is directly proportionate to the preservation of cutaneous sensibility of the abdomen. Muller and Sidelman noted preservation of the abdominal reflexes on the paretic side in a patient suffering from tabes and capsular hemiplegia. Purves-

Stewart makes the interesting, but not surprising, observation that in the tabetic gastric and intestinal crises with hyperesthesia of the abdominal wall the skin reflexes are often exaggerated.

As a result of the studies of Strumpell and Souques upon the behavior of the abdominal reflexes in disseminated sclerosis there has been acquired valuable clinical knowledge of the early manifestations of this disease. In an examination of 70 patients Souques found the reflexes abolished on both sides in 61 instances, or 87 per cent, and diminished or lost in part in two of the remaining nine cases. Goldflam finds them frequently affected, but not simultaneously or to an equal degree in all of the reflexogenous zones. Monrad-Krohn, likewise, writes of their alteration early in the course of the disease, but is of the opinion that they are more often diminished than abolished, and never exaggerated. In 86 cases he noted total loss of the reflexes in only 56 per cent. Soderbergh could elicit all of the reflexes in only two of 26 patients, and Hedde in 65 instances found them totally abolished or otherwise affected in 86.2 per cent. Trioumphoff states that the epigastric reflex is earliest and most frequently affected. Loss of these reflexes is often accompanied or soon followed by the appearance of a positive Babinski toe reflex, and although they disappear and reappear during the course of the affection, their abolition is more often enduring.

Since multiple sclerosis has its greatest incidence in the presumably healthy young adult and often presents as its earliest manifestation alteration of the abdominal reflexes alone or accompanied by the nervous symptoms common to the so-called neuroses, it is important to know whether or not the abdominal reflex is ever actually lost in the healthy adolescent and in the functionally neurotic, or is the failure to elicit it in these two classes of individuals due to a lack of skill and training in the technic of examination?

That the abdominal reflex exhibits certain peculiarities is a more or less general opinion. It is inconstant and variable in the same individual under different conditions; it is very readily inhibited; and it is easily fatigued. Bilateral abolition of the reflexes, in the absence of other evidences of disease, is said to be of little or no diagnostic value, but their unilateral or segmental loss and their disappearance during the process of examination are regarded as indicative of a definite pathological change. Rosenbach, in the examination of a large number of healthy individuals, obtained the reflex in every instance, and persistent efforts are, according to Oppenheim, usually successful in eliciting a response in healthy persons. He and Lewandowsky refer to the studies of Muller and Sidelmann who, in an examination of 1,000 healthy soldiers, found the reflexes constantly present with one exception. This, they attributed to incomplete examination. In a further study of 2,000 healthy young women with normal abdominal walls they did not fail to obtain the reflex in a single instance. Monrad-Krohn and Stern-Piper have also found it constantly present in healthy young adults. Thus, while Schuster, Soderbergh, Gowers, Goldflam and others refer to the occasional absence of the reflex in healthy persons, it seems that its abolition is not so frequent that one is warranted in declaring it as lost before he has exhausted every effort to elicit it.

No systematic study of the abdominal reflexes seems to have been made in the functional neuroses. The presumably neurotic adolescent patient in whom the abdominal reflexes are not elicited might, after all, be in the incipient stage of multiple sclerosis, and only long-continued observation will furnish the evidence necessary to determine whether failure to evoke the reflex was due to faulty technic, to the supposedly neurotic disorder, or to early disseminated lesions. Goldflam, Hedde and Stern-Piper state, however, that these reflexes are sometimes lost in the constitutional neuropathic and psychopathic states. It is not unlikely, however, that failure to elicit them in these conditions might be attributed to an error in technic, to one of the non-nervous affections in which the reflex is difficult to obtain, or to unconscious inhibition on the part of the patient. I have not met with an instance in which, with persistent efforts, they could not be elicited in the so-called psychoneurotic. Turner and Stewart are also of the opinion that they are rarely, if ever, affected in the minor neuroses, and Goldflam is emphatic in stating that they are never abolished in these conditions. In hysteria, however, with its objective sensory and motor defects, the abdominal reflexes are sometimes affected. Curschman finds them uniformly present unless there is anesthesia of the abdominal wall, and Redlich records a similar experience; but Lewandowsky, Oppenheim and Crouzon state that they are often, if not always, abolished in hysterical and suggested anesthesia of the abdomen.

In conclusion, then, the following deductions might be made:

(1) The true abdominal reflex is a superficial skin reflex and is obtained only by stroking the surface of the abdomen and lower thoracic wall.

(2) It is of clinical advantage to divide the abdominal area into several reflexogenous zones from which segmental contraction might be elicited.

(3) The reflex is best elicited with some form of blunt instrument with which the stroke is made in a definite direction in each of the zones; and stimulation with the electric pencil is of distinct advantage in conditions which tend to inhibit the reflex.

(4) Although the reflex might be diminished or lost in a number of nervous and non-nervous disorders, its behavior in the healthy young adult and in the psychoneurotic is of greatest significance.

(5) There is some evidence to indicate that, with persistent efforts, the abdominal reflex should be uniformly obtainable in the healthy young adult and in the functionally neurotic. Its absence, therefore, in these two classes of individuals has added significance in the early recognition of disseminated sclerosis.

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DISCUSSION (*Abstract*)

Dr. Richard C. Bunting, Memphis, Tenn.—Sensory loss, peripheral or central, must be profound before the abdominal reflexes are affected.

Dr. Byrnes' reference to the absence of abdominal reflexes in many clinical conditions, in particular multiple sclerosis, prompts the following question. Why, in the early stages of some cases of multiple sclerosis, do we sometimes find the abdominal reflexes absent, while, if we try for them some weeks later, we find them present? I have had a case which during its beginning showed this phenomenon. Absence of abdominal reflexes in this clinical condition often has much to do with our giving a definite opinion as to the presence or absence of this disease.

While it may be discussed pro and con whether perivascular demyelination is the essential and pathologic lesion of disseminated sclerosis, or is, as Spiller believes, a primary change in the neuroglia, we are not attempting to say. If we take the first hypothesis, it may explain why in some cases the abdominal reflexes are present at one time and absent at another during the early manifestation of the disease. Is it not probable that demyelination in sclerosis is a very gradual, though progressive process; that there are periods, even though short, in this disease when the symptoms seem to be halted, checked? Perhaps it is during these periods of so-called "remission" that we are able to obtain the abdominal reflex which was absent at some previous time.

There are many authorities who believe that disseminated sclerosis is attributable to a former acute infective illness. Westphal and Marie hold this view. Is the premise without reason that the agent, living or not, responsible for the peri-vascular demyelination, the primary lesion of multiple sclerosis, which starts around the smaller arterioles and can be traced around branches of the same vessel, is at times more active and at other times less so? Perhaps it is in the latter, when the active process appears dormant, that we are able to obtain the reflex upon cutaneous irritation. When the sclerotic lesion, cicatricial in nature and composed of a thick mass of neuroglia fibrils, is complete, which is a late stage of the process, requiring years for its full evolution, the abdominal reflexes are lost permanently.

Dr. C. E. Dowman, Atlanta, Ga.—I have always looked upon the abdominal reflex as one of the very important features of a neurological examination. As a matter of fact, in cases of brain injury, with frequent

unconsciousness and lack of ability to cooperate in the neurological examination, we have to depend often on just a few things, and of these the abdominal reflex is one of the most important.

In brain trauma, the abdominal reflex may be absent on the side opposite the greatest amount of brain contusion, where there may be practically no alteration in the other reflexes. It is often thought that the cremasteric and the abdominal reflexes go hand in hand as far as their disappearance is concerned, but I have often found that the cremasteric reflex may be present under certain circumstances (for example in some lesions of the cerebral cortex or subcortical region), whereas the abdominal reflexes may be absent.

As Dr. Byrnes has brought out, it is very often the case that one can predict in cases of apoplexy which side is to be the hemiplegic side by the disappearance of the abdominal reflex.

I have seen many cases in which an early multiple sclerosis has been suspected, practically before the appearance of other symptoms, simply by the disappearance of the abdominal reflexes. As a matter of routine in such cases, we make a careful perimetric visual field study and not infrequently have been able to pick up a central scotoma, which, with the loss of abdominal reflexes, has led to the diagnosis of multiple sclerosis before the development of the pronounced symptoms and findings.

The study of the abdominal reflexes has been of particular value in the localization of spinal cord tumors. We very frequently have to depend entirely, unless we resort to the injection of the spinal canal with lipiodol, upon the presence or absence of the abdominal reflexes in localizing tumors of the lower thoracic cord. In such lesions the upper, the middle and the lower abdominal reflexes must be studied individually.

There are two conditions that one must always keep in mind, one of which Dr. Byrnes has emphasized. A relaxation of the abdominal musculature on account of former pregnancies may interfere with the appearance of the reflex. In very obese individuals it is often impossible to obtain a visible reflex. In certain cases of abdominal rigidity one is unable to obtain a reflex. This is particularly true in cases of extra-pyramidal lesions.

Dr. Byrnes (closing).—Dr. Bunting stated that in every instance loss of the abdominal reflex is associated with a sensory defect on the skin of the abdomen. This is not, strictly speaking, correct. The abdominal reflex is essentially a cortical reflex and dependent upon the integrity of the cortico-spinal system. Complete anesthesia of the entire abdominal surface must of necessity abolish the reflex, but, ordinarily, its abolition is quite independent of any sensory change.

It is not my intention to discuss the pathology of multiple sclerosis. It is true that in this disease the abdominal reflex might be obtained at one time and not elicited at another, and it is well known that variability of symptoms is a common feature of this in multiple sclerosis.

CONSERVATIVE SURGICAL TREATMENT OF PELVIC ENDOMETRIOSIS*†

By LAWRENCE R. WHARTON, M.D.,
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Endometrium may be found in most unusual places in the female pelvis. Dr. W. W. Russell, whom many of us knew, was the first to discover ectopic endometrium in the ovary in 1899. Nine years later Dr. Cullen published his book, "Adenomyoma of the Uterus," presenting cases in which uterine epithelium had invaded the muscular coats of the uterus. Islands of uterine epithelium were soon found in other places, the round ligaments, sigmoid, utero-sacral ligaments, vagina, fallopian tubes, umbilicus, peritoneal surfaces and rectovaginal septum. These conditions, however, were not recognized very commonly, were regarded almost as curiosities, and hence the subject of misplaced endometrial growths attracted relatively little attention.

The question was opened wide and the medical public stopped to look carefully, however, when Dr. John A. Sampson announced in 1921 that many so-called chocolate cysts of the ovary were endometrial in origin. These growths were very common, were often referred to as blood cysts and were generally believed to be associated with some irregularity in the life history of the corpus luteum. As such, they had been regarded as benign, simple collections of blood which had very little clinical importance. When Dr. Sampson stated that they were endometrial in origin and were capable of undergoing all the vicissitudes of endometrium, including menstruation, decidual reaction, malignant degeneration and peritoneal implantation by perforation, the subject assumed great significance. Dr. Sampson stated that many of these islands of misplaced endometrium in the ovary and elsewhere reached the various situations by traversing the fallopian tube. Regardless of their source, the work of Sampson caused the medical profession to realize that pelvic endometriosis, and in particular perforating chocolate cysts of the ovary were of much greater importance and occurred much more frequently than we had ever supposed.

Our ideas concerning the proper treatment of

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these hemorrhagic cysts of the ovary naturally underwent a profound change as soon as Sampson's findings were accepted. Before that time conservation had been the rule, an effort being made to save the ovary by removing only the diseased portion. Even when it was necessary to remove the whole ovary, we did so without suspecting that the condition was often bilateral and that the tiny black pinhead cysts on the apparently sound ovary were the beginning of the same process. The relation of these endometrial rests in the ovary to other similar lesions in the pelvis also was unknown. When the medical profession learned these facts and realized that therein lay a partial explanation of the failure that had often attended former efforts at ovarian conservation, the pendulum swung to the opposite extreme, and radical surgery became the accepted procedure in many places. We can remember some of the extensive extirpative operations that consequently were performed in these cases six or seven years ago in the effort to remove all the pelvic endometrial growths. In 1921 and 1922 an operation for adenomyoma was often more difficult and extensive than panhysterectomy for cancer, and still may be.

As time passed, however, and we failed to see recurrences in our earliest cases, a more conservative attitude began to be adopted, although it seemed rather risky. Since 1922 it has been my policy to be conservative when possible, and this paper is a resume of my experience in these cases. So far as I know, no one has yet published a study of end-results in the conservative treatment of pelvic endometriosis, although in 1925, during the symposium on the subject in the convention of the American Gynecological Society, Dr. Sampson remarked that he had been practising surgical conservatism and in a recent letter to me he again repeated that statement.

Every surgeon has to answer the following question when operating upon a case of pelvic endometriosis: can I save the functions of menstruation and child-bearing, or is it necessary to remove the uterus, tubes and ovaries?

In arriving at an answer, one must take into consideration numerous factors: the age of the patient, the extent of the disease, the marital state and desires and the presence of associated pelvic disorders. Although all of these factors are important, the two which either compel radical extirpation or allow conservation are, the extent of the endometrial invasion and the presence of associated pelvic disorders. Of all the associated disorders, myomata are the most annoying; indeed, the almost constant association of chocolate cysts and uterine fibroids makes one wonder whether the relationship may be wholly circumstantial.

This study is based on a series of thirteen cases of pelvic endometriosis that I have operated upon and whose subsequent course I am familiar with. For purposes of classification, I shall divide these cases into two groups: first, those in which radical surgery was performed; and, secondly, those that were treated conservatively. For the time being, I have considered conservatism to be synonymous with the preservation of the child-bearing function and radicalism to mean the opposite. In studying these cases in retrospect, we shall attempt to discover the conditions which made radical surgery necessary or conservatism possible, and try to determine whether the efforts at conservatism were worth while.

CASES IN WHICH RADICAL SURGERY WAS NECESSARY

In nine of the thirteen cases radical operations were performed, in that the uterus was removed with either one or both ovaries. What factors made radical extirpation necessary and what results were obtained?

1. *The Extent of the Endometrial Lesions.*—In these nine cases, endometrial degeneration occurred in both ovaries six times, in only one ovary twice, while in one patient, 53 years old, both ovaries were normal. The utero-sacral ligament was involved in one case, the *cul-de-sac* of Douglas in six, sigmoid six, round ligament three, peritoneum seven, rectovaginal septum twice, cervix six. It is thus evident that pelvic endometriosis was rather advanced in these instances.

(2) *Associated Disorders.*—In none of these nine cases was the uterus normal. In seven, myomata were present, and in only one instance was the myomatous uterus smaller than a three months' pregnancy. In the two remaining cases that did not have myomata the uterine wall was infiltrated with uterine glands, adenomyomata. In all of these cases, therefore, the uterus was seriously involved.

(3) *Age.*—The question of age is vitally important in determining the course to follow, for one will take endless pains to preserve the child-bearing function when it is compatible with health. In these patients the average age was 39, the youngest 32 and the oldest 53.

(4) *Marital State.*—Five of these women were

single. Had they married, it is difficult to see how they could have conceived or carried pregnancy to term. Of the four married women, only two had conceived, and they had subsequently been sterile for eleven and twenty years respectively. This gives one a fair idea of the likelihood of conception in cases such as these.

OPERATIVE TREATMENT

The first patient in this series was operated upon in 1921, and in this instance I followed the custom then in vogue of performing a panhysterectomy. This patient had an advanced adenomyoma of the rectovaginal septum, sigmoid and endometrial cysts of both ovaries. In all of the others, supracervical hysterectomy was done, occasionally including a deep cone of cervical tissue or with a cervical cauterization. In five cases, both ovaries and tubes were removed; in four, part or all of one ovary was left.

In one patient, only 33 years old, I did a very high supracervical amputation of the uterus and was able to save a small piece of ovarian tissue in the hope that the menstrual function might be preserved and premature menopausal symptoms avoided. In these particulars we failed, since menstruation ceased abruptly and the climacteric symptoms were rather distressing.

Endometrial lesions in the sigmoid, round ligaments, uterosacral ligaments and rectovaginal septum were removed as completely as was feasible, care being taken not to damage otherwise healthy organs. In one instance, the condition of the patient compelled me to leave untouched a nodule as large as a walnut behind the cervix, deep in the rectovaginal septum. This patient was then 53 years old, and this nodule, plainly visible and palpable on vaginal examination, has steadily diminished in size during the three years that have elapsed.

End-Results.—There were no deaths in this series and these patients have all been free from pelvic disturbances or recurrences since operation. This is significant in view of the fact that in several instances growths on the sigmoid, rectum, rectovaginal septum and peritoneum could not be completely excised. Some of these growths which could be felt per rectum have either disappeared or diminished remarkably as time has passed. The average time since operation in this group is three years.

END-RESULTS FOLLOWING CONSERVATIVE OPERATIONS

In four young women, aged 25, 26, 29 and 31, we were conservative in the sense of preserving the menstrual and child-bearing functions. Three of these patients were married, one engaged to be married. None had conceived, and the chief complaint of two was sterility. The other two complained of pain in the pelvis, right iliac fossa and back. The menses were rather profuse in all, and in two extremely painful. Leucorrhea was so malodorous and severe in one case that the patient hesitated to attend public gatherings. Arthritis was present in one. In all, there was a moderate anemia and two had a peculiar, almost characteristic pasty appearance that is often seen in these cases. The diversity of symptoms and the difficulty in diagnosis can be fairly well summarized by stating that the pre-operative diagnoses were myoma of the uterus, chocolate cyst, retroposition of the uterus, appendicitis, chronic salpingitis, and in one case ureteral stricture. These diagnoses were all made either by myself or capable physicians for whom I saw these patients.

Endometrial lesions were found in both ovaries in three cases, in one ovary once. Peritoneal implantations were present in three cases and there were implantations on the meso-appendix in one. The uterus was abnormal in every instance. In two the uterus was myomatous, containing multiple tumors, some of which were as large as lemons. In one, there was a solitary adenomyomatous infiltrating growth about 3 cm. in diameter. In the fourth, the uterus contained no tumors, but was deeply retroflexed and with the chocolate cysts was firmly adherent to the pelvic floor.

It is thus evident that in essential characteristics the pathological picture is the same at the age of 25 as at 45. The fundamental difference is that as years pass the ovarian destruction becomes greater, implantations more numerous and uterine tumors increase in size. It is quite apparent that in these women between the ages of 25 and 31 the pelvic organs were not so badly involved as they were in the other groups that we have just considered.

Although the individual histories of these patients were so instructive that I have studied them with profit, lack of time prevents the presentation of more than a summary.

Case 1.—I was called to see the first patient of this series six years ago, when she was on the operating table. A very well known general surgeon had just completed an appendectomy and called me because he found free fluid, chocolate colored debris and large masses in the pelvis. When I reached the operating room I was told that the young woman had just graduated from the hospital training school for nurses and was engaged to be married in three months. I resected a chocolate cyst about 8 cm. in diameter from

the right ovary, removed three myomata of various sizes and suspended the uterus. The left ovary and both tubes were normal. This young woman was married on the appointed day and two and a half years later was delivered normally of a full-term healthy child. There were no complications, the pelvis was normal on palpation and there have been no pelvic complaints since.

Case 2.—The second patient, aged 29, came to see me in 1925, complaining of sterility. She was underweight, pale, lacked energy and the menses had become increasingly painful. There was also some intermenstrual pelvic discomfort. I found a mass as large as a golf ball in the right half of the pelvis and, since the husband had had gonorrhea, I thought that the wife's sterility was due to salpingitis. Nothing was done for five months, when the family physician called me up, saying that the patient had developed severe acute polyarthritis, which looked to him like gonorrhea. The operation was determined upon and we expected to be compelled to remove both fallopian tubes. We found bilateral adherent chocolate cysts of the ovaries and three myomata. The surgical treatment was multiple myomectomy, left salpingoophorectomy and appendectomy. The tubes were normal.

Two years later, after enjoying perfect health and freedom from arthritis, she was delivered of a normal child. The pelvis was normal and labor uncomplicated.

Case 3.—Three years ago, the wife of one of my classmates in medical school came to see me because of sterility and leucorrhea. She was 31 years old. Menstruation and the general health were normal, but the patient had a pasty complexion and was always tired. The leucorrhea was so profuse and malodorous that it was embarrassing. On examination I thought that the uterus was retroflexed, adherent and contained several fibroid tumors. The operation was done three months later and during that time the tumors had increased almost 100 per cent in size. It was then evident that we were probably dealing with a severe non-specific cervicitis and chocolate cysts. We cauterized and dilated the cervix, stripped both ovaries clean of any endometrial growths, suspended the uterus and removed the appendix.

The patient was delivered normally eight and a half months later. She probably had conceived just a few days before the operation, although none of us had suspected that she was pregnant. The subsequent health has been excellent.

Case 4.—This case emphasizes two points: first, the diagnosis may be extremely difficult before physical findings become definite; and second, the extent of endometrial invasion may be entirely out of proportion to the palpatory findings. This young woman, twenty-four years old, complained of extreme nervousness, pain in the right lower abdomen and right lumbar region, profuse and painful menstruation, nausea, irritability of the bladder and lassitude. These symptoms had been becoming gradually worse for four years. There was occasionally a slight leucorrhea, which on rare occasions had been tinged with blood. On examination the pelvis felt perfectly normal except for marked tenderness. There was also definite tenderness through the right iliac fossa and the right kidney was low and moderately sensitive. In view of the negative findings in the pelvis, I thought that the discomforts were probably due to chronic appendicitis or ureteral stricture. I advised observation, and the patient was given a rest cure for six weeks, which yielded definite but only temporary benefit. In October, 1926, I was again asked to see the patient at the close of a sharp attack of pain in the right iliac fossa, accompanied by low fever, nausea and vomiting, and at that time we removed a slightly injected appendix and curetted the uterus. Through the McBurney incision, the right ovary looked normal, except for a small Graafian follicle cyst, which ruptured. The ovary was not adherent or enlarged. The uterus was normal.

For a few months the improvement was definite, after which the pain in the right half of the pelvis and back became more severe than ever. In view of the negative findings in the pelvis, I thought it advisable to eliminate the right urinary tract. The cystoscopic findings were negative, but the patient insisted that the catheterization of the right ureter and the irrigation of the right kidney pelvis reproduced her old pain. We, therefore, gave her a course of such treatment, with relief which was only temporary. When she returned six months later almost incapacitated, we found that the ovaries had become lightly adherent and the uterus seemed a little enlarged and sensitive. I then made a tentative diagnosis of bilateral endometriosis of the ovaries. At operation, we found both ovaries lightly adherent and honeycombed by small black endometrial cysts. There was a chocolate colored deposit with several black beady cysts on the pelvic floor over the right ureter where the right ovary had been lying, and the uterus contained a soft, circumscribed but not encapsulated adenomyomatous nodule as large as a walnut. I removed the right ovary, excised the uterine growth and debrided the left ovary as completely as possible.

One year has passed since the performance of this operation. For the first six months, improvement was slow, but consistent. There was a moderate gain in weight, the continuous pelvic discomfort diminished and the menses became painless and normal in amount. We were, therefore, greatly encouraged. Then, however, the pelvic pain and dysmenorrhea returned, the patient became nervous, lost her endurance and ceased to gain weight. The menstrual flow also diminished remarkably in amount, so that at the present time there is practically only a spotting for less than two days; and with the marked diminution of the menses there have appeared disturbing vasomotor phenomena which suggest menopausal symptoms.

When the patient left the hospital in January, 1928, the pelvis felt perfectly normal and insensitive, and this was the state of affairs for six months. Two months later a little nodule appeared at the left uterine cornu and the left half of the pelvis was distinctly sensitive. In November, 1928, ten months after the operation and four months after the symptoms of recurrence began, the left ovary was found to be fixed, a little larger than on former examinations, exquisitely sensitive, and the nodule at the left uterine cornu was distinctly larger than it had been. The left half of the pelvic floor also felt thickened and nodular.

This young woman is again an invalid and our efforts at conservatism have been an obvious failure. In this case we have been impressed by the rapidity and the extensiveness with which new growths have appeared throughout the pelvis. It may be that in this instance we were dealing with an unusually active process.

SUMMARY

It is desirable to treat pelvic endometriosis conservatively in young women, and when the

conservative treatment is successful the end-result is well worth while. Such patients have conceived and for periods of six years have remained in perfect health. If one can be reasonably sure that the ovaries can be stripped completely of endometrial growths, if the uterus can be left in a healthy state and if the pelvic organs can be left in normal positions, then one can attempt conservatism with a fair chance of a gratifying result. In my experience, in patients over thirty-five years of age, the pelvic disorders are so grave that conservation is usually unwise. Also when both ovaries and the uterine wall are involved in endometriosis, conservative measures are very risky.

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DISCUSSION (*Abstract*)

Dr. Robert Thrift Ferguson, Charlotte, N. C.—The question has been raised whether these chocolate cysts might be produced by the Rubin test, which could force scraps of the uterine mucosa through the tubes and into the peritoneal cavity. I have performed the test more than a thousand times myself and have not seen this complication follow.

In regard to endometrial transplants I wish to report a case of a young woman 17 years of age upon whom I operated eighteen months ago. The patient had double pus tubes following an acute Neisserian infection and both tubes were removed. About one year later she began to menstruate at each period from a small blue spot in the scar where the drains had been inserted. This is the first case in my experience which occurred in the abdominal scar.

Dr. Wharton (closing).—I know of no instance in which the Rubin test has been a factor in causing pelvic endometriosis. It is, of course, conceivable that a current of gas under pressure might blow bits of endometrical tissue through the fallopian tubes. The Rubin test should not be performed, of course, haphazardly or roughly and should never be done during menstruation or the phase of premenstrual swelling.

TREATMENT OF UTERINE FIBROIDS*

By WILLIAM NEILL, JR., M.A., M.D., F.A.C.S., Baltimore, Md.

My daily experience reveals a remarkable lack of uniformity among the medical profession in its ideas of the treatment of uterine fibroids. Too little value is ascribed to conservative methods and there is too general a tendency to operate. Before stating my views as to the indications and treatments it might be well to review some of the more general characteristics of this condition.

Uterine fibroids are among the most common of all neoplasms. In the Gynecological Clinic at the Johns Hopkins Hospital they are associated with one-eighth of all pelvic disease. They are well known to be more common in the colored race. Heredity apparently plays no conspicuous part, nor do habits or other diseases. With rare exceptions they are benign and may cause no symptoms or produce a multitude of complaints. They tend to produce sterility and vary in size, type and rapidity of growth. Excessive hemorrhage usually is met with in the smaller types. They are prone to prolong menstruation and the menopause, but when the latter is established there is a tendency for them to cease growing and decrease in size. In rare instances they may even disappear. Hyaline changes with areas of calcification are not uncommon, and in the larger tumors cyst or abscess formation may be encountered; in these leucorrhea usually is profuse and may be so foul as to suggest malignancy. Pain, when present, is not from the tumor itself, unless there is infection or malignancy, but due to torsion of a pedicle or pressure upon an adjacent viscus.

Uterine fibroids have their origin in small nodules within the musculature. As they develop a distinct capsule clearly differentiates them from the surrounding normal uterine tissue. The vast majority probably remain interstitial, some enlarge outward, becoming subperitoneal, others inward, becoming submucous. They usually are multiple and it is not uncommon to find all types in one uterus. True cervical

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fibroids are rare, occurring in not more than 3 per cent of all cases. Sarcomatous changes are exceedingly rare and when present are not curable by any treatment. Malignant changes of the endometrium and cervix are not uncommon, but of no greater frequency than in normal uteri. Lateral inflammatory conditions are more frequently associated with the myomatous than with the normal.

The types of treatment have been many and varied. Among the palliative measures known to all are the drugs ergot, stypticin and calcium lactate, as well as hygiene, rest in bed and cold to the abdomen, with minor surgical procedures, such as curettage and local application to the endometrium. I am sure the medical profession has long since given up any expectation of finding a regulative drug to control uterine hemorrhage. The electric treatment of Apostoli and others of the French school has never been practised to any extent in this Country.

The indications for treatment depend upon the general condition of the patient and the symptoms presented, following an accurate diagnosis made from a careful history, general examination, blood studies and pelvic and abdominal palpation with diagnostic curettage. It is just within the past forty years that routine active treatment of these tumors has become general. We have today the choice of one of the following plans of treatment: (1) to operate and remove; (2) to radiate; (3) to let alone and observe.

I believe that operation is the wiser choice in the following types: (a) tumors associated with much pain; (b) tumors accompanied by pelvic inflammatory disease or any well-defined lateral complication; (c) very large tumors filling the pelvis and lower abdomen and extending up to or above the umbilicus; (d) all tumors complicated by malignancy of the uterine body or cervix; (e) tumors definitely interfering with urinary function when lodged within the pelvis; (f) when there is a reasonable doubt as to the exact nature of the diagnosis; (g) larger tumors accompanied by lacerated, infected, hypertrophied cervices which might lead to a later development of malignancy.

Radiation is indicated: (a) in all tumors with hemorrhage, from small myomatous nodules up to freely movable tumors reaching as high as the umbilicus, and in selected cases above the umbilicus; (b) in any of the operative class when surgery is contra-indicated on account of the patient's general condition.

The let alone and observe plan, as yet rarely recommended by physicians at large, I believe, is best in a large number of cases. Treatment is not indicated merely because a fibroid is present. Many symptomless tumors are discovered in the course of a routine examination when treatment for the condition is unnecessary. The patient should be informed of its existence and advised to have yearly examinations.

The operation for hysterectomy was first performed in 1843 by Charles Clay, of Manchester, England, and the first surgeon in America was John Bellinger in 1846. In both cases the operation ended fatally. J. Eastman's name is indelibly associated with pan-hysterectomy, since he performed the first operation in 1889. Trenholme, of Montreal, in 1871, first advocated the removal of the ovaries as the operation for fibroid tumors, but it was discontinued during the eighties. Hysterectomy, however, developed with care and skill through two generations from the days of Kimball, Atlee, Burnam, Stinson, Keith, Kelly, Price and others down to the present time, has become one of our safest major surgical procedures.

Myomectomy is limited in its execution to a single or several definitely isolated tumors. Its mortality rate is higher than that of hysterectomy and, when hemorrhage is a symptom, it often does not bring relief and there is always a tendency to recurrence requiring subsequent treatment. It does not leave a distinct possibility of pregnancy and normal childbirth, but this is also possible in some fibroids without myomectomy.

During the past fifteen years radiation has been used in the treatment of this condition with increasing success by the gynecologist, the results improving *pari passu* with the improvement of technic and selection of cases.

Radiation will accomplish the following: (a) control hemorrhage and check menstruation; (b) reduce the size of the tumor; (c) in the majority of instances cause its complete disappearance; (d) occasionally in younger patients there is a return of normal menstruation. Radiation from the primary mortality standpoint is a safe procedure. The effect is not definitely understood. Against the conception that the influence is mainly through the ovaries are the facts that many fibroids take on activity after the removal of the ovaries and that marked regression occurs in tumors treated by radiation in patients past the menopause. For these reasons it would seem that there is a specific and direct action on the tumor itself and it is possible to

secure the desired result quite independent of permanent destructive action on the ovaries. In rare instances we have known tumors to disappear without the cessation of menstruation. This is very exceptional, however, for as a rule there is no reduction till cessation has been established and it is evident from this that a treatment to bring about complete amenorrhea is necessary in order to secure a satisfactory result. An accurate pre-treatment diagnosis is more important when radiation is considered than operation. In every instance an examination under anesthesia with a diagnostic curettage should be made. Submucous fibroids presenting at the cervix should be removed by vaginal myomectomy, and when other tumors are present the same general principles as to operation or radiation should be applied. The fact that a tumor is subserous, interstitial, submucous, single or multiple is of no significance so far as the response to radiation is concerned. Seventy-five per cent of all fibroids are amenable to radiation. The response of a tumor to radiation is variable; in some the reduction is apparent before amenorrhea is fully established. Often smaller tumors will disappear within six months; in others the reduction is slower, extending over many months or even years after the bleeding has ceased. Approximately 80 per cent of the smaller fibroids and 50 per cent of the larger ones disappear.

In our Clinic at the Howard A. Kelly Hospital, for those selected for radiation, we prefer radium rather than x-ray. The treatment should be intra-uterine, but when the canal is short or too tortuous to allow proper introduction of the radium bearing sound, the treatment can be supplanted by external application, and in these cases radium in sufficient amounts, or the x-ray, can be used with equal success. Intra-uterine radium is simpler of application, more rapid in bringing about the desired effect and is better in that it acts on the diseased organ, the uterus, where the major radiation should be received more intensely than on the ovaries. It thus offers the possibility of doing away with the tumor without destruction of the ovaries. The dosage for the individual case can be calculated more accurately and a more even distribution obtained throughout the tumor with less general body radiation. In this group its brilliancy of curative results is fully equal to that of radical surgery, while it offers the advantages of freedom from danger, pain, suffering and the various post-operative complications and sequelae. Should radiation fail, we still have operation to resort to and have not lost time, but, on the other hand, gained by the patient's improved health from a cessation of hemorrhage in the waiting.

In a summary of 650 cases treated at our Clinic there were no deaths from the treatment and no condition tending to shorten life was encountered. The same holds true for over 1,000 cases in which radiation was used, including fibroid and other uterine conditions. An immediate cessation of menstruation was established in over 50 per cent. In the majority of the remaining only one menstruation occurred, while in the rest cessation was established in from two to four months. In sixteen, a return of normal menstruation occurred without regrowth of the tumor after intervals of from three to five years. One of these has since been delivered of two healthy babies, while another has given birth to two normal children and one stillbirth at full term. In the vast majority the symptoms attendant upon the artificial menopause were less pronounced than in the normal. These symptoms are not uncommon after hysterectomy, even when one or both ovaries are preserved. Cullen finds them present in 52 per cent. No outstanding symptoms were noticed except leucorrhea following the intra-uterine application, continuing for a few weeks to a year. Among the 650 cases 54 hysterectomies were performed; 33 were done at other hospitals a short time after the treatment from a difference of opinion on the part of the surgeon operating. Five died as a direct result of the operation. Of the remaining 21, three were operated upon within six months on account of intra-uterine infection; four because of no reduction accompanied by cystic degeneration; ten for no reduction and return of hemorrhage. There were no deaths in this series. Two were operated upon elsewhere at the time for other intra-abdominal conditions. Normal sized uteri were removed. Two were later operated upon for adenocarcinoma of the body, one developing five years after treatment and the other eleven and a half years; both remained well and free from symptoms in the interim and I have no belief that there was any causal relation between the malignant development and the previous radiation.

It is the opinion of a number of surgeons that radiation is contra-indicated for the treatment of uterine fibroids in the presence of grave anemia. There is a definite type in which I have found this to be true, in which operation should be given the first choice, no matter what type of tumor is present. I refer to the definite aplastic

anemias. This condition is rare, but occasionally met in those giving a history of long-continued bleeding. Here the hematopoietic system has to a great extent lost its power of regeneration. The white blood cells are decreased and a low hemoglobin exists with a relative decrease in the red blood corpuscles and platelets and the presence of embryonic cells in the blood stream. However, all true secondary anemias presenting none of the above features I find are ideally suitable for radiation. In 34 secondary anemia cases treated with radium with hemoglobin varying from 15 to 40 per cent and size from small intrapelvic tumors to those reaching nearly to the umbilicus, 27 are alive and well from periods ranging from three to fourteen years. In none were there any complications noted from the treatment and there was a prompt rise of the blood picture to normal on cessation of the bleeding. Three later had hysterectomies safely performed after the health had improved. One died in ten weeks, collapsing under a blood transfusion, the hemorrhage not having been checked. Three were perfectly well for three years. One died from a diagnosis not learned, but not related to the pelvis. One died from cancer of the large bowel and one from cancer of the stomach. During the time of life there had been no return of the hemorrhage and a complete absence of pelvic symptoms.

CONCLUSIONS

(1) Small symptomless fibroids should not be treated.

(2) When no complications exist and the tumor is still within the pelvis, radiation is the method of choice from the standpoint of mortality, morbidity and economic consideration.

(3) Operation is the method of choice in the presence of pelvic inflammatory complications; if radiation is used at all, it must be external. Operation is also the method of choice when any doubt exists as to the diagnosis, and in all cases of aplastic anemia.

(4) The large fibroids present an interesting problem. Diagnostic difficulties are increased and the percentage of satisfactory results from radiation is not so great as in the smaller ones. On the other hand, operative difficulties also are increased. I disagree radically with those who select cases for radiation or operation on the basis of size. Immense tumors frequently disappear entirely following radiation.

SUMMARY

It is obvious from what has been said that there are definite fields for operation, radiation and observation. There is too much interference with fibroid tumors on insufficient indications. Each case should be given careful consideration and the method followed which seems logically to meet the individual need. I believe it is a mistake to lay down any hard and fixed rules. The absence of mortality and the greatly lessened economic disablement, particularly in those who must work for a living, favors radiation as a first choice, especially as it in no way makes operation more difficult should this ultimately be necessary.

DISCUSSION (*Abstract*)

Dr. Guy L. Hunner, Baltimore, Md.—I am quite human and I like to operate upon these interesting fibroids; but my rule is to operate only upon those that are large enough to choke the pelvis. Dr. Neill has told us that they can successfully irradiate tumors that are up to the umbilicus, and I know they do so because they have done it for some of my cases; but as a rule I prefer operation if they are large enough just to fill the true pelvis. I have never seen it mentioned in the literature, but it comes to me from a fairly wide experience, that those cases of fibroids that show sarcomatous degeneration are cases in which the pelvis is just about filled. In other words, possibly the element of pressure comes in in some way to start sarcomatous degeneration. If they are up above the pelvis and free in the abdomen we often send them to Dr. Kelly and his associates, and for one reason or another they sometimes send them back. I think the strongest argument in favor of operation in these cases is that you cannot always tell definitely whether they have pelvic inflammatory trouble associated with the fibroid, and irradiation is not indicated if they have an inflammatory condition.

You as obstetricians are most interested in the patients who have fibroids and are anxious to have children, the sterile patients. Of course irradiation is not suited to them. Dr. Neill reported two patients who have had children after irradiation. In other words, menstruation was re-established and they became pregnant. But that is uncertain at best, and I am sure that Dr. Neill would tell us that we ought to operate upon those patients who are very anxious to become pregnant, who have never had children, because in a fairly large proportion of cases we can remove the fibroids, leave the pelvic organs intact, and give them a chance for pregnancy.

One of our nurses who was 38 years old when she married came to me because of sterility after she had been married a year. We found her uterus full of small fibroids, the largest one perhaps 8 cm. in diameter. In a patient of 38 one hesitates to do a multiple myomectomy. It is a big risk to take for the slight chance she may have from that time on of having any children. Also, if she does bear children, she is likely to have more or less trouble doing so. This patient had three children after being operated upon, and we felt it was worth while. Then again in families where there is the question of succession, particularly those who

have great wealth, you take a greater chance in your operation than with the poor patient, with the understanding that you are taking a chance, and that the patient is taking a larger chance of her life if you preserve her organs.

Just a word as to the technical points of myomectomy. It is my practice ordinarily to do a hysterotomy during the operation. Of course, if there are a lot of superficial or interstitial fibroids, and you are fairly certain of getting them all out, and the patient has no history of excessive menstruation, you are safe in doing a multiple myomectomy without seeing the condition of the mucous membrane; but if the patient has had excessive menstruation then by all means during the operation you should split the uterus down the middle, expose the mucous membrane and make sure about its condition. If there happen to be small submucous fibroids or polyps this gives you an opportunity to remove them with curettage from above.

Many, many cases of fibroid, as Dr. Neill said, have no symptoms from the fibroid, and we are often wrong in operating upon them.

The ureters are responsible for many symptoms usually referred to the pelvic organs. In patients sent to me by general practitioners because they have found a small fibroid in the uterus, I frequently find on investigation that most of the pain is in the kidney region at the time of the menstrual period, but some of it is in the lower ureter, and the patient tells the general practitioner that she has "ovarian" pains. From this he concludes that pain is from the pelvic organs and that fibroids are the cause. These patients may be tender over the ureters or in the broad ligament region, and I have difficulty in postponing an operation to get them to submit to trial treatment that will relieve their symptoms. The general practitioner has told them that there might be an operation and sometimes it is difficult to handle the matter diplomatically and show him that it is not what the patient needs. With the modern appreciation of surgery, the public has been trained to seek hospital care for all sorts of things, and it has been taught by us that the route of the knife is a sure road to quick recovery for everything. Thousands of appendices are removed every year without causing improvement in the patient's condition, and gynecological operations are done when the trouble is in the urinary tract instead of the gynecological tract. The public is now beginning to react a little and to avoid operation when possible.

Dr. J. R. McCord, Atlanta, Ga.—Our Clinic is the only haven of refuge for negro women in our city. As you know, negro women have many fibroids and much pelvic inflammatory disease. We are trying to run an absolutely conservative clinic, not an operative clinic, but a clinic to cure negro women, and we have to consider the economic side of the question.

We are told that radium should not be used in the uterus in the presence of pelvic inflammations. We find it difficult to tell whether some negroes have or have not pelvic inflammations. Practically all of them have had such diseases. The decision as to the use of radium in the treatment of fibroids, in the negro, is a difficult one.

Dr. D. Y. Keith, Louisville, Ky.—We do not believe the use of radium in the uterus in the presence of a chronic inflammatory pelvis that is quiescent will light up or cause an acute inflammatory pelvis. It is true that these cases are reported and in our observation of surgeons who have reported them, it is due to the trauma of pulling the uterus down for a thorough curettage and not to the use of radium. If the cervix is dilated, preferably under no anesthesia, and the radium applied gently, with no pulling down of the uterus and no trauma to the adnexa to break down Nature's protective wall in the chronic inflammatory pelvis, no more reaction will occur than occurs from the use of radium or x-ray as a skin application over the pelvis. We have used radium on a few patients who have refused operation, or were not operative risks, where we were sure a chronic inflammatory lesion was present, and in only one of these have we had any reaction. This one had a low grade inflammatory pelvis on the left side which was drained through the vagina. She promptly recovered, the fibroid, which was the size of a four months' pregnancy, being reduced 75 per cent in size.

Dr. Neill (closing).—During the child-bearing period the possibility of pregnancy is preserved following a myomectomy. In my experience this is the exception, however, and the myomectomy frequently does not relieve symptoms. An important observation in this series is the comparatively large number of fibroids treated with radium in physicians' families. I was interested to hear Dr. Keith state that he gives intrauterine radium in the presence of definite lateral inflammatory conditions without fear of complications. My experience has led me to feel that operation is the wiser choice in such instances. In large tumors of exceptionally rapid growth the diagnosis is difficult and operation is to be preferred over radiation, as they often show ovarian or uterine malignancy.

In the colored race myoma is invariably associated with pelvic inflammatory disease and it is my practice to operate upon them.

POST-OPERATIVE TREATMENT OF TONSILLECTOMY*

By WALTER A. WELLS, A.M., M.D., F.A.C.S., Washington, D. C.

There is perhaps no jest so often repeated at the expense of the surgeon as that in which he is represented as having reported that "the operation was successful but the patient died." There is, we fear, a grain of truth in the libel implied, for, in our heart of hearts, we must admit that the traditional enthusiasm of the surgeon for the exercise of his operative skill, with his comparative disregard for subsequent events, sometimes works to the actual disadvantage of the patient.

It is certainly true that the interest of a surgeon in an operative case invariably reaches its zenith in the performance of the operation, and that the post-operative course is regarded by him, as a rule, as in the nature of an anti-

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climax; and where there is decline of interest there is apt to be, we know, relaxation of effort.

Theoretically, of course, we are all fully aware of the real importance of faithful post-operative care of our cases, but too frequent evidences of neglect justify an occasional recurrence to the subject in medical discussions in order that the latest and best information may become known and its application emphasized.

Proper post-operative care is of great value for three reasons: firstly, for securing more comfortable convalescence; secondly, for effecting a shortened convalescence; and, thirdly, for assuring a better result.

In contrast to the alleged viewpoint of the surgeon, the success of an operation for the patient himself is judged by his post-operative reactions. For him, the pre-operative preparation was a period of apprehension and the operation itself an ordeal. Either he was unconscious at the time of the operation and therefore unaware of the brilliant technic which intrigued the surgeon and his assistants, or conscious, but unable in the then state of his mind to register adequate appreciation of this phase of the work.

But, in the days which succeed, he is keenly sensitive to every feature of the case, highly critical of untoward events, extremely grateful for comfort and favorable results.

Careful attention during the post-operative period is highly desirable, however, apart from the sensations or opinions of the patient, because it may have much to do with a successful outcome and the attainment of the best results.

There are many complications that can occur following the tonsil operation which may have a very unfavorable effect, and some of such serious nature as even to lead to a fatal termination.

We have elsewhere discussed the most dreaded of all accidents, hemorrhage, and referred to the evidence of its much greater seriousness as well as greater frequency than the literature of the subject would indicate.

Another accident of great concern to which especial attention has been called in recent years is pulmonary abscess. There are also reports of many cases of phlegmonous inflammation of the throat, some involving the larynx and ending fatally; and also there have been a number of cases of general septicemia with polyarthritis.

Of more frequent occurrence, though of far less gravity, are suppurative inflammations in the middle ear, leading sometimes to mastoiditis; and there are numerous reports of a complicating nasal or pharyngeal diphtheria. Pneumonia occasionally follows; cardiac and renal disturbances have been observed; while hemiplegia, jugular thrombosis and mediastinal abscess may be mentioned as some of the rarer complications which can occur.

Intelligent supervision following operative work is essential to the early recognition of all complications and sequelae, and I am of the opinion that proper post-operative treatment will go a long way toward their prevention.

The after-care required for a case of tonsillectomy will depend, to a considerable degree, on the nature of the case and the skillfulness with which the operation is done, and in some degree on the pre-operative preparation of the patient.

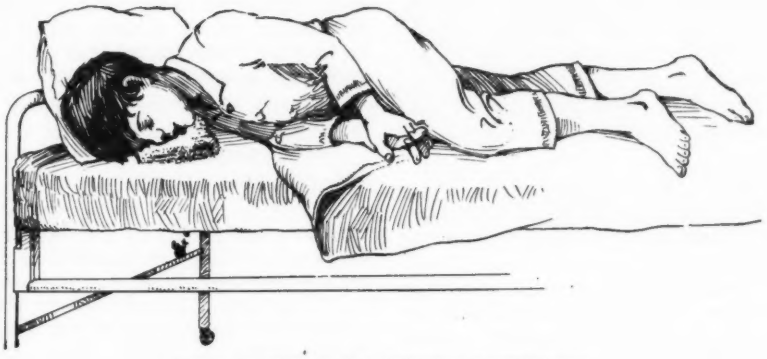
In this connection, too great emphasis cannot be placed on the importance of avoiding operating upon a patient suffering at the time from acute local inflammation. We are sure that most of the severe post-operative reactions of which we hear are due to premature surgery on patients who have had a recent severe local infection.

Post-operative troubles may be made great or little, according to the degree of care taken during the operation itself to stop all bleeding, and in this matter we are strongly in favor of erring, if you would so call it, on the side of extreme caution.

In our own practice, we have adopted the habit of placing ligatures at certain favorite sites of bleeding in all cases where hemorrhage does not promptly cease, using a special instrument of our own design, which we have found very practical for the purpose. Since we adopted this method post-operative bleeding has become an almost negligible factor.

Post-operative care for tonsillectomy begins immediately following the operation, even before the patient has left the table. It concerns itself with the thorough removal of all blood or blood clots from the fauces by suction or swabbing, or by turning the patient with face downward. Next, care must be exercised in removing the patient from the operating table. We too often see a child doubled up in a nurse's or assistant's arms with the head so flexed on the neck as to produce compression of the larynx and hinder free breathing.

Where there is a tendency to swallow the



Proper position in bed following tonsillectomy.

tongue, either a breathing tube must be immediately inserted or the patient must be constantly supervised until he has reacted from the anesthetic.

Of great importance is the position in which the patient is placed on being taken to his bed.

Unless especially instructed otherwise, most nurses will place the patient on his back and allow him to continue in that position. This is, of course, open to the objection that bleeding may go on unsuspected. The blood may either trickle down into the lower respiratory passages, or, if the reflexes have returned, be swallowed and find its way into the stomach, the former a dangerous occurrence, and the latter an exceedingly unpleasant one; both, indeed, dangerous if continued, in preventing a recognition of the fact of bleeding.

For these reasons, many operators advise a completely prone position in bed with the face downward. This is awkward and uncomfortable. The position which we prescribe as a routine and have found most satisfactory is as follows:

The patient is placed on his right side, the weight of the upper half of the body falling chiefly on the right shoulders; the extended arms are allowed to fall easily in front of the body or lightly folded on the chest.

The right leg is extended, but the left is flexed and the knee drawn well forward and over it, so as to come in contact with the bed in front of it. The head takes a natural, uncramped position on the side and, since it is lower than the body, any blood or mucus or saliva will easily overflow out of the corner of the mouth. Instead of the pus pan which may dig into the patient's eyes on sudden movement of the body, we place under the mouth a large pad of gauze, having the basin always conveniently at hand for eventual necessity. It is well to place a small pillow just back of the head to steady it and keep it in position.

For the first twenty-four hours following the operation the best treatment is no treatment. We see nothing but harm in interfering with the patient, to paint his throat, to give him medicine, or have him gargle.

My aim for the first few hours, at least, is to keep the family or friends away, darken the rooms, and encourage the patient to pass into a prolonged, natural sleep.

In the case of an adult, an ice collar is ordered to be placed about the neck as soon as reaction has set in. We do not always approve of this for a child. In the first place, the child is usually rebellious to its use, and, in the second, more often than not, the ice collar will in a short time be found low down on the sternum instead of in apposition to the region of the tonsil fossae.

Most surgeons, we find, are in the habit of ordering, if not in the first twenty-four hours, at least immediately thereafter, some form of gargle; generally soda or salt or aspirin or some combination of an alkaline or antiseptic nature.

We believe that gargles are not only not beneficial, but are actually contra-indicated in the premises. It is known that, for the average person, an attempt to gargle simply means a gurgling of the fluid which is supported behind by the anterior pillar and base of the tongue without reaching the pharynx; and even if this were not so we feel that the wounded structures should be left alone as much as possible, both on account of their

inflamed state and the possibility of starting a hemorrhage. For the same reason, the movement of the muscles incident to the use of the voice and to mastication is a disadvantage; and it is well to enjoin unnecessary speaking and to exercise careful regulation of the patient's diet.

For the rest of the day following the operation, only fluids should be taken and these sparingly or not at all in the event of nausea and vomiting.

On the following day, we advise a soft bland diet to which one may make gradual additions, taking care, however, to avoid food that is hard, acid or highly seasoned. If the patient is using an ice collar, we avoid ordering at the same time hot drinks, giving preferably iced drinks or ice cream.

Whether a laxative should be given shortly after the operation depends upon conditions.

If there is reason to believe that the patient has swallowed much blood or is running from some cause a fever, a mild cathartic is advisable.

We have seldom found it necessary to give narcotics following tonsillectomy, and we are of the opinion that the habit of some surgeons of ordering almost regularly a hypodermic the first or second night is to be condemned. The patient has usually little spontaneous pain, and, if left alone, will sleep well.

There will, of course, soon develop more or less painful swallowing, a symptom which in some cases reaches a high degree of intensity and becomes the most distressing feature of the post-tonsillectomy period.

For relief of this symptom we have been using for some time a lozenge containing acetanilid (1 grain) and acetyl salicylic acid (2 grains), and to this we have recently added phenol (one-eighth grain) to answer the requirements of a local antiseptic.

Acetyl salicylic acid is frequently used in a gargle for the same purpose, but, as was already stated, there is a decided objection to the use of gargles following tonsillectomy.

Furthermore, it is much more effective in lozenge form than when in solution, because in solution it begins almost immediately to hydrolyze and the patient instead of acetyl salicylic acid is really getting a mixture of acetic and salicylic acids. In the lozenge form the hydrolyzation becomes active only when the substance begins to dissolve in the secretion of the mucous membrane, which is exactly what is to be desired. The lozenge of the formula mentioned is put up in elegant and palatable form by the pharmaceutical house of John Hancock & Co.

The habit of painting or swabbing the throat the first two or three days after the operation is, like the gargling, also a useless and perhaps even a harmful intervention.

The greyish slough which soon forms by a coagulation necrosis over the denuded area of the tonsil fossa is to be regarded as a protective process and ought not to be disturbed. If, later on, it becomes thick and foul, we advise a free irrigation of the throat with a warm salt or boric solution. If, at the end of a week, healing seems to be slow in progress, the wounded surface may be gently swabbed with an argyrol or mercurochrome solution.

In the case of children, the least done in the way of local treatment the better.

Where adenoids have been removed along with the tonsils, it is advisable after two or three days to instill a warm, alkaline solution through the nose. With the head tilted back this will flow, as a rule, freely down over the posterior pharyngeal region, including the tonsil fossae.

In case of excessive nausea and tendency to vomiting, the patient should, of course, fast until this unpleasant symptom has subsided.

We have found it helpful to put a quantity of crushed ice in the Dobell solution, of which a particle may be taken and swallowed from time to time.

When vomiting is excessive and persistent, one must consider the possibility of its dependence on a state of acidosis.

All children who give a history of gastro-intestinal upsets and cyclic vomiting (particularly when associated with diarrhea) should, previous to the operation, be put on a high carbohydrate diet.

It is important that after the operation a starving regime should be avoided, and that as soon as possible within twenty-four hours a liquid followed by a soft diet should be ordered.

In acidosis cases, especially if there is more than a small amount of bleeding, it is advisable to order a retention enema of sodium bicarbonate and glucose. A child six years of age may easily take 200 c. c. of a 10 per cent solution in soda, and this may be given before he reacts.

Hemorrhage after tonsillectomy is one of the most distressing and alarming complications that

can happen and one of the most difficult to deal with.

Notwithstanding every precaution before, during and after the operation, bleeding will sometimes take place.

Economical consideration should not, therefore, stand in the way of having at least for the first twenty-four hours an intelligent, observant nurse.

If not already experienced, she should be instructed in the difference between the appearance of fresh, red blood, indicating bleeding, and dark grumous blood regurgitated from the stomach. She should be especially instructed to observe the occurrence of frequent movements of the Adam's apple as indicating possible swallowing of the blood, and to give the alarm at once on noting the occurrence of a rapid, thready pulse or other evidences of collapse.

What is best to do for the relief of bleeding depends upon the circumstances of the case. We have little faith in the value of local styptics or of medicine given internally to control arterial contraction or to produce coagulation.

If the bleeding is slight or apparently of the character of a general oozing, pressure by cotton sponges saturated, if you like, with dioxygen, or with glycerite of tannin, or with a weak Monsell solution, or an application made of larded park, as recommended by Hurd of New York, may be tried. If there is, however, a spurting vessel or lively arterial bleeding, nothing less than ligation will answer.

In some patients this can be carried out without the use of an anesthetic, but in the case of children generally, and of very nervous adults, or patients with sensitive, irritable throats, general anesthetization will be found necessary.

In former days, the tonsil operation was less seriously regarded than it is today, and performed frequently upon patients in the ambulatory department of the hospital who were allowed to return immediately to their homes. In some localities, chiefly for economic reasons, or because of lack of sufficient bed accommodations, this method is still used.

Comparison of results has proved it to be a bad practice, and statistics show a frequency of complications as much as four times that in patients who are kept in the hospital after the operation.

On returning to their homes, all patients should be instructed to remain a couple of days longer in bed, then begin gradually to get about and out, according to their strength and the evidences of recuperation.

I have made it a rule to advise patients not to go out of the city in less than two weeks from the time of the operation for fear of the possibility of secondary hemorrhage known occasionally to occur at even so late a date.

That tonsillectomy should be regarded as, in fact, a major operation is the universal contention of up-to-date laryngologists of the present day, and we find that their voices are always raised, sometimes in the face of considerable opposition, to convince hospital boards of the necessity of supplying adequate bed accommodations for the after-care of these patients.

It cannot justly be said of the laryngological surgeon that his operative enthusiasm, however high it may run, ever really blinds him to the true welfare of his patient. He is certainly not one of those who look upon an operation as successful *per se* regardless of results. For this reason, he cannot be indifferent to the subject of post-operative treatment, and with regard especially to cases of tonsillectomy he must realize that post-operative treatment is a matter of importance not only on account of the physical and mental comfort of the patient for the time being, but that it may count much toward the ultimate success of the operation.

DISCUSSION (*Abstract*)

Dr. D. H. Anthony, Memphis, Tenn.—Intelligent nursing care adds much to the safety and comfort of the immediate post-operative period. Every post-operative tonsillectomy patient who can afford the expense should have a special nurse for the first twenty-four hours and longer if complications arise.

Patients operated upon under a general anesthetic should be placed in the proper position as Dr. Wells has thoroughly described in his paper, without a pillow so that the lips will touch the sheet after a breathing tube of proper size and tongue controller (Lumbard's) has been inserted. This tube is made in two sizes and can be removed and cleaned and re-inserted by the nurse as frequently as is necessary. A small portable suction machine should be available at all times for the patient if there is a tendency for the accumulation of more secretion in the throat than can be taken care of by the patient's reflex mechanism.

Every patient's throat should be inspected and full post-operative orders should be written on the chart. I write the following orders for my post-operative tonsillectomies:

Liquid diet first day.

Liquid and soft diet after first day.

Local anesthetic cases, use ice collar and back rest.

General anesthetic cases, keep the windows closed and patient covered for five hours following anesthetic. No ice collar used.

Lumalgin tablets (1 to 2) dissolved on tongue one-half hour before meals four times a day.

One-third grain pantopon tablet by mouth for adults every four to six hours if needed for severe pain in throat.

Sodium luminal (ampoule) gr. ½ to 1 gr. (for children) and gr. 2 (for adults) hypodermically every four to six hours if needed for persistent vomiting. All vomitus saved for the operator's inspection. Notify the surgeon any time, day or night, if bleeding of any consequence occurs, if patient vomits up a marked amount of bloody secretion, or if patient wants a question answered.

Every post-operative throat should be carefully inspected the afternoon of the operation.

The morning after the operation the operator should carefully acquaint himself with the condition of the patient during the interim. The chart should be inspected thoroughly. If the patient is in fairly good condition and lives in the town in which he was operated upon, usually he should be permitted to go home. If he lives out of the city he should stay in the hospital for forty-eight hours.

When the patient leaves the hospital post-operative directions in writing should be given him, because it has been my experience that he rarely remembers any of the details of the more important instructions. I have for several years been giving the patient a printed instruction sheet as follows:

First day at home, remain in bed or on a couch. Take mild cathartic such as aromatic cascara sagrada (teaspoonful for a child, two teaspoonfuls for an adult).

Diet, ice cream, cold milk, gelatine, custards, soft cereals, egg-nogg and chocolate milk.

Second day, may be up a few hours morning and evening, lying down the remainder of the day. Use same cathartic if needed. Diet, the above mentioned articles plus soft boiled eggs (without pepper), well mashed potatoes mixed with soft boiled egg, soft part of bread soaked in milk.

Third day, out of bed but no exertion, such as bending over or lifting anything. Diet, the above, plus soft meats (without pepper or other spices).

Fourth day, may go out of doors if weather permits. No violent exercise. Diet, add other ordinary foods, but avoid for several days more anything very hard or very hot.

During the first week after operation it is most important to avoid eating very hot, hard, sour or highly spiced foods.

If the breath is foul, gargle four or five times a day with 1 part of hydrogen peroxid and 3 parts cold water. If there is much pain in ears, throat or head, use prescription given below.

Do not be alarmed at white membrane in throat, which is always present for ten or fourteen days after operation.

If nauseated take one-third teaspoonful of baking soda (bicarbonate of soda) in half glass of cold water every three or four hours.

Return to my office four days after operation for examination of throat.

If any bleeding occurs, sit erectly, breathe deeply through the mouth, gargle with the above peroxide mixture, or drink ice water slowly, and notify the operator.

In case of bleeding, or when uneasy regarding the patient's condition, or if in doubt about the diet or anything concerning the patient, telephone the operator.

Use your tooth brush soaked in saturated solution of sodium perborate after each meal.

The following prescription is given as the patient leaves the hospital:

Lumalgin (Empirin, gr. V; luminal, gr. ¼) tablets 25. Sig: Dissolve one tablet on tongue and swallow (for child) or two tablets (for adults) one-half hour before meals three or four times a day.

I have used various drugs in an effort to overcome the soreness in the throat and ears, especially marked soreness when the patient takes nourishment, among them being aspirin, allonal, empirin, empirin compound, orthoform and lumalgin.

Dr. Wells was kind enough to have John F. Hancock, of Baltimore, Maryland, send me two dozen tubes of post-tonsillectomy lozenges, each lozenge containing:

Acetanilid	1 Gr.
Acetylsalicylic acid	2 Gr.
Anesthesin	¼ Gr.

Use one or two of these lozenges dissolved on the tongue immediately before eating. They are excellent for relief of painful swallowing following tonsillectomy.

These I used in addition to lumalgin, empirin and orthoform tablets and found that the majority of patients preferred the lumalgin tablets over the other three tablets. However, Dr. Wells' tablets are a distinct addition to our armamentarium in an attempt to provide some relief from soreness in the throat preceding meals.

If a patient bleeds much after a tonsil operation the operator should remove the clots and see where the bleeding is coming from. If there is a very free bleeding vessel, he should send the patient back to the operating room, where he can get a competent assistant and suction to help him. If the patient has returned home he should be sent back to the hospital to the operating room and the bleeding vessels should be ligated by inserting catgut around the vessel with a needle. Insert the suture above and below the bleeding vessel, and tie it loosely.

Dr. J. A. Stucky, Lexington, Ky.—If we adopt the post-operative position which has been called to our attention, we shall have less after trouble.

I think it wise always to start peristalsis within twelve hours after operation. I do not give an active cathartic, but something. Usually the mother or a relative knows what acts best with a child. I am heartily opposed to gargles of any kind. I let the patients rinse the mouth out frequently, but caution them not to gargle.

At the end of thirty-six or forty-eight hours we get splendid results, not from swabbing the throat or touching the entire fossa, but by taking some cotton in a pledget supersaturated with from 3 to 5 per cent mercurochrome or 10 per cent neo-silvol, and gently touching the supratonsillar fossa so that the solution runs down over the entire tonsillar base.

Dr. Clifton M. Miller, Richmond, Va.—After every tonsil case we must be sure that the tonsillar fossa is absolutely dry and free from any possibility of the formation of a small adherent clot. If a little clot forms in there and sticks you will in five to eight days have bleeding from the granulated surface, which is usually easy to control, but is exceedingly annoying to the patient.

In regard to vomiting afterwards, in consultation with some of my pediatrician friends I have adopted this plan: if the patient vomits more than two or three times I put on the bedside table a drachm of bicarbonate of soda in an ordinary tumbler of water, keep it filled with ice and see that it is kept cold. Every time the child, or even the adult, will take it, give him a teaspoonful. He will vomit the first one, but very soon the vomiting will cease.

According to the recommendation of Le Boutillier, I have used in adults two or three times the intravenous injection of a c. c. of triple distilled water, inserting

the syringe into the vein, the water in the syringe, and withdrawing into the syringe one c. c. of blood, letting it remain for sixty seconds by the watch, and then re-injecting it into the vein. In both instances where I used that the vomiting was promptly controlled. In small children you can use this procedure hypodermatically, not intradermally. What the action is, or why, I do not know, and I do not believe Le Boutillier has been willing yet to express himself as to why; but we get the reaction immediately with the use of the intravenous method that I have outlined.

Dr. George B. Collier, New Orleans, La.—There is a simple method to stop bleeding, especially applicable in an emergency. If the patient is a child, or even an adult, and there is a blood dyscrasia and we have used every effort we can and have not time or facilities for a blood transfusion, take 10 or 20 c. c. of blood from one of the parents, or in the case of an adult from a close relative, and inject it into the gluteal muscle. I have seen that give good results in three cases lately.

Under the old school I took pharmaceutical chemistry, and I was taught not to prescribe things like lumalgin and aspirin. For example, instead of saying lumalgin, say luminal gr. ¼ and acetylsalicylic gr. 5, which is exactly the same as lumalgin.

If we prescribe proprietary preparations it goes out through the Southern Medical Association records that they are good and that we are endorsing them. I think we should not do it, and I believe medical schools should lay more stress on that. We tell our students that they should not promote individual proprietary preparations.

Dr. Pinkney V. Mikell, Columbia, S. C.—We all speak of tonsillectomy as being a major procedure, and yet many let adult patients go home within twenty-four hours of operation. It is not consistent. In Columbia most of us tell a patient who goes home from the hospital in less than five days that he goes at his own risk. We advise him not to go back to work for a week or ten days. I have had both my appendix and tonsils taken out, and I would rather go through the laparotomy.

It is better to keep a general anesthetic case in the Trendelenberg position on the table until his reflexes come back. It does away with breathing tubes and other devices which promote hemorrhage.

The morning after operation we should inspect the fossa for clots and remove them at that time, and that is the only manipulation necessary. We cannot lay down a specific rule for gargles, but as a general rule gargles make the patient more comfortable.

My own personal experience is that warm drinks are much more comforting than cold. Of course with children it is a great bid to make them behave by offering them ice cream after twenty-four hours. We used to give it the day of operation, but it increases the nausea and we give them orange juice now instead.

Acidosis is due more to excessive purging, causing dehydration of the children, than to any other cause, and since we have adopted the plan of magnesia the night before and an enema the morning of the operation, it is practically a thing of the past.

In regard to anodynes, I have to take issue with Dr. Wells. Morphin lessens shock and the danger of secondary hemorrhage. In the last 300 children I have used morphin as soon as the child reacts. The results have been most satisfactory. In adults after the first twenty-four hours codein and acetyl salicylic acid in powdered form give the patient great comfort.

Dr. Wells mentioned egg-nog in after-treatment. It is a great pity that we have gotten away from milk punches and egg-nog. Many of our patients, down and out after operation, respond wonderfully to whiskey punches. I wish that we could get good whiskey for these cases.

Dr. John T. Crebbin, Shreveport, La.—The removal of a patient from the operating table to the carrier is very important. I have seen an orderly pick a child up as if he were a sack of potatoes.

Patients should remain in the hospital for twenty-four hours at least. A gargle is always contraindicated. Petrolagar, plain or alkaline may be used as a mouth wash, and the patient may swallow the solution.

About ten years ago a member from Baltimore suggested the following for relief of pain while swallowing: one standing behind the patient grasps the head over the ears, with the flat of the hands. The head is gently pulled upwards until the muscles of the neck are on a stretch. The patient is then able to swallow with ease.

Hemorrhages are usually controlled by pressure. I frequently use bismuth subgallate powders on sponges with excellent results.

Dr. G. M. Maxwell, Roanoke, Va.—I think that the underlying factor in the pain following tonsil operations is a dry throat, caused by the patient's refusing to swallow. If any well man will refuse to swallow for twenty-four hours he will have a very sore throat.

I agree with Dr. Wells that the gargle is not the best treatment and for some time I have not used it. I use a 5 per cent acetyl salicylic acid solution, giving an adult a tablespoonsul, and a child one to two teaspoonfuls every two hours, to be swallowed, not used as a gargle. In this way you get the local and general effect of the acetyl salicylic acid, and I find it much superior to the gargle.

Dr. H. E. Christenbery, Knoxville, Tenn.—The results of the operation depend upon the preparation of the patient, the technic, and after treatment. There should be as little trauma as possible, quick, clean work, and close observation of the patient for at least twenty-four hours in the hospital. We should give our patients instructions how to take the proper care of their throats and themselves following tonsillectomy, as well as in any other operation. We find some patients who will lie perfectly still for days and not attempt to swallow or talk. Their throats become dry, their jaws set and they will naturally have a great deal of discomfort. I have my patients exercise their tongue and jaws after the first twenty-four hours. I also give them cracked ice, ice cream or some hot or cold liquid, and have them gulp it down, and not sip at it. For an antiseptic and for the relief of pain or swallowing, I swab their throats with a solution of guiacol (liquid) one dram to olive oil ounces one. If this is done a few minutes before meal time the patient can eat a meal with very little discomfort.

I have my patients return for observation and after treatment about every two or three days for a week or ten days. If you have not tried the after treatment with the solution of guiacol and olive oil try it, but do the swabbing gently. It will burn for a few minutes and the throat feels good. If you have your own throat operated upon try it and I am sure you will approve of the treatment.

Dr. Wells (closing).—Some one objected to the use

of the term "aspirin" and I think the point is well taken, so I hope the editor will use "acetyl salicylic acid" where the word "aspirin" occurs in my paper.

While we have differences on certain points, the discussion shows we all agree that the operation is one of some moment, and we agree that it is a matter of importance carefully to supervise the post-operative care of these cases. These points are intensified when we consider that after all a tonsillectomy is an elective operation; it is not an emergency operation at all. The patients come to us as a rule in comparatively good health, and they are not operated upon in order to be relieved of any severe, acute illness, but in order that their health may be made better. Therefore if any serious accident happens under those circumstances it is less excusable, and it does much to the discredit of the physician and to the operation.

EMOTIONAL STRESS AND ALLERGIC CUTANEOUS MANIFESTATIONS*

By JEFFREY C. MICHAEL, M.D.,
Houston, Tex.

More and more in my practice, difficult cases of chronic urticaria, eczema and cutaneous pruritus are being elucidated by study of the psychic state of the patient. The principal factors concerned in the pathogenesis of allergy are well known. Attention is directed here to that modicum of cases in which grief, sex conflict, disappointment, worry and other emotional stresses are the presumably predisposing factors upon which the allergic state develops.

In this necessarily brief presentation it is impossible to go further into the many aspects of the subject, some of them debatable, and therefore I will proceed to illustrate my experience by several cases chosen for the purpose.

Case 1.—Several years ago a middle aged man presented himself complaining of a generalized itching. No cutaneous lesions were present and a diagnosis of cutaneous pruritis was made. Despite a thorough investigation and local applications, including ultra-violet light, the itching continued. It was then found that he was under great mental strain because his business was insolvent. Nothing completely relieved the pruritis until he went through bankruptcy proceedings and took a position with another firm. His itching then disappeared and has never recurred.

Case 2.—A beauty parlor proprietress in her early thirties came to see me for a persistent urticaria. The disease appeared in attacks usually in the late afternoon after she reached home. She gave polyvalent protein reactions and at first improved under appropriate diet, but later did not respond. She then volunteered the information that she kept house with a friend of whom she was very fond, but that this girl and she had become estranged and quarreled a good deal. The attacks of urticaria appeared soon after the estrangement and developed after a quarrel. Some time afterwards, the estrangement was patched up and the urticaria ceased.

Case 3.—A middle-aged widow presented herself with a violently itching papular dermatitis of the neck and right shoulder of brief duration. A competent internist reported no systemic abnormalities. Despite rest in bed, restricted diet and local measures, the eruption spread and the distressing itching continued. She was then transferred to a hospital and in three days, under buttermilk diet, the disease almost completely disappeared. Spinach was added to the diet and two hours later the eruption reappeared in full intensity. She left the hospital several days later and then an inquiry into her mental state revealed that she had married without love, but, though leading an exemplary life, had fallen in love with another man, whom she had learned had developed cancer of an internal organ. This gave her great concern; she became restless and sleepless and soon after the eruption appeared. Its exacerbations were associated with letters and telegrams which she was receiving, and even the upset apparently due to spinach followed a telegram of more than usual import. The patient, who had steadfastly resisted all inquiry into her mental state, improved from the time she unburdened herself, and in a short time was well.

Case 4.—A young woman from Des Moines, while sojourning in Houston, came to my office with urticaria of three years' duration. She had received thorough investigation from the allergic standpoint. Questioning brought out a broken engagement about six months before the onset of the urticaria, family friction, and recurring mental upsets from unavoidable contact with her estranged fiance, whom she still loved. The patient herself sensed that the urticaria was associated with these emotional stresses. Psychotherapy helped her considerably and during the latter part of her stay in Houston the urticaria disappeared, with one outbreak when she received a disturbing letter from home.

Case 5.—A married woman had pruritis vulvae and insomnia. The usual investigations revealed no cause for either. Inquiry revealed that the patient was under great mental strain due to a quarrel with her brothers and sisters over her father's estate. Both symptoms disappeared after a few talks with the patient. Only recently she reported with a recurrence of the vulval itching and it was found that she would soon have to appear in court on legal proceedings connected with the estate. In this case a sexual element was suspected, but inquiry in this direction revealed nothing.

Case 6.—(Patient of Dr. E. R. Seale.) This young married woman had chronic urticaria of several months' duration. Inquiry developed that the disease appeared soon after she separated from her husband. The husband was making efforts at reconciliation, but the patient resisted these attempts. She said that exacerbation of the urticaria occurred whenever she heard from her husband and was upset by his appeals. She was advised to think out her situation and settle it one way or the other. This she did and reported later that the urticaria had disappeared.

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COMMENT

Were time available, it would be interesting to discuss hypotheses concerning the association of such emotional stress and allergic cutaneous manifestations. Such discussion would embrace the influence of psychic stress on gastro-intestinal function, on the endocrin and autonomic nervous system, singly and collectively.

It is realized that definite conclusions could not be drawn in the present state of our knowledge, but this does not invalidate or weaken the clinical experience which shows us the influence that psychic disturbances have on allergic manifestations. This influence is probably not direct, but is predisposing.

DISCUSSION (*Abstract*)

Dr. Isaac R. Pels, Baltimore, Md.—I believe that many of our failures in therapy are due to the fact that we do not give the comprehensive attention to patients that we should, and by that I mean not necessarily the physical examination and all the laboratory tests, but we should do what Dr. Michael does, namely, secure a social service survey of the situation.

One of the things we all do is to overtreat our patients, or after they have been treated by someone else we endeavor to use some therapy which the other man has not used. If we will become amateur or partly amateur psychologists we may get to the bottom of many of these conditions. This does not mean that we should treat them all by psychotherapy. That question has been splendidly brought out recently by Klauder of Philadelphia.

Dr. Thomas W. Murrell, Richmond, Va.—This paper makes one wonder how many things we do therapeutically that are really helpful. The treatments are radically different. I cannot help wondering whether it is not often the psychic effect that is working.

Dr. Jack W. Jones, Atlanta, Ga.—I believe this is a subject which we are all overlooking. In cases of this kind local applications and internal medication will do no good.

Dr. E. R. Hall, Memphis, Tenn.—I wonder if any of you have made basal metabolism determinations during a consultation with these patients showing allergic manifestations, and checked them a few days later when the symptoms had subsided? I think many of their troubles are due to hyperthyroidism.

Dr. G. B. Lake, Chicago, Ill.—It may not be out of order to speak of the modus operandi, in connection with these cases showing allergic manifestations.

We all know that the emotions have a powerful control over all the ductless glands. We know the connection between the endocrin secretions and the sympathetic system. We know that the vasomotor system is under the control of the sympathetic system and that the freest blood supply is in the skin. It seems, therefore, philosophical reasoning that the emotions should react upon the condition of the skin. The endocrin secretions have a profound effect in controlling the elimination of toxins from the system, and we know how the toxic substances in the blood will affect the skin; so it seems to me there is nothing esoteric about this reasoning.

Dr. D. C. Smith, University, Va.—In spite of the fact that investigation has not uniformly found abnormality of the content of the blood calcium in urticarias, the long continued empirical use of calcium in this condition, makes most of us slow to discard this drug in the treatment of urticaria. Recently, at the suggestion of Dr. Ormsby, I have been using intravenous injections of calcium chlorid. The dose is one gram in 10 c. c. solution intravenously once or twice daily. In one patient, a dentist, where no cause could be found for the urticaria, three daily injections were given with prompt and complete symptomatic relief.

More recently I have been using calcium gluconate (Sandos) with apparently as good results and less immediate reaction.

This is an empirical method, but is almost as prompt in its symptomatic relief as is the injection of adrenalin.

Dr. Grafton Tyler Brown, Washington, D. C.—This discussion sounds very much like a discussion on asthma of about ten years ago, when asthma was considered by many physicians to be due to a neurosis. Urticaria is one of the most difficult problems that the allergist or dermatologist has to deal with. I believe that most if not all cases of urticaria are due to some form of sensitization, even though all skin tests may be negative. We see a number of patients who, from their own experience, know that their urticarial attacks are due to eating certain foods, and yet skin tests with these same foods are completely negative.

Emotional stress will at times, precipitate an attack of urticaria, just as a hot bath or strenuous exercise frequently will, probably due to the increased circulation of blood in the skin. I have one patient, for example, who is sensitive to orris root and wheat flour, and if she plays a strenuous game of tennis, she breaks out with urticaria. The sensitizations are the underlying cause of her trouble, and exercise merely brings it to the surface.

Urticaria is very commonly met with, and merits further intensive study. I believe, however, that we should stay close to the sensitization idea, and far away from psychoanalysis. Sensitization will probably explain most of these cases, in time.

Dr. H. M. Robinson, Baltimore, Md.—We know very little regarding the mechanism of sensitization. One thing certain is that patients are frequently seen in whom there are exacerbations or hives, following emotional stress.

But I do not think that any of us can decry food sensitization. In dermatology, we are getting away more and more from the mere treatment of the skin, and going further into medicine, studying the relation of the condition to other parts of the body.

CLINICAL SIGNIFICANCE OF CONGENITAL DEFORMITIES OF THE GENITO-URINARY TRACT*

By Wm. E. Lower, M.D.,
Cleveland, Ohio.

Preventive measures and newer methods of treatment have made surgical operations unnecessary in many conditions which were formerly treated surgically, but regardless of what further limitations may be made in the field of surgery, the treatment of congenital deformities will probably always be surgical. In this discussion we shall deal only with certain congenital deformities of the genito-urinary tract. Not all of these anomalies require surgical treatment, but in a goodly percentage pathological conditions develop which make treatment necessary. In fact, many of the congenital abnormalities of the upper urinary tract are often overlooked until some serious complication arises which directs attention to them.

DEFORMITIES OF THE PENIS AND SCROTUM

Hypospadias.—One of the most common anomalies occurring in male children is the defective development of the urethra, hypospadias being the most frequent form in which this anomaly occurs. The condition is classified according to the anatomical location of the external urethral opening. If the opening is just beneath the glans penis, it is known as glandular hypospadias. This is the least objectionable form of this deformity. It often passes unnoticed and the child grows to manhood without being inconvenienced or without his parents being aware of the abnormality. If his attention is called to it, however, a man with such a deformity often worries about the condition and seeks treatment, and an inexperienced physician may advise surgical treatment. The result is usually a worse deformity than before operation, for it is a condition which is not easily corrected and one that never needs correction. To attempt it is meddlesome surgery.

When the urethral opening is anywhere along the penile portion of the urethra, the condition is called penile hypospadias. If it interferes with urination in the standing position or with coupulation, the condition should be corrected, and this can generally be done without great difficulty, although failures are not infrequent.

In the third type of hypospadias the urethral opening is in the scrotum or perineum. This condition always demands correction and the surgeon's ingenuity may be severely taxed to correct it. Many operations have been devised and this fact is in itself sufficient evidence that no one method is always successful. I recently transplanted the appendix in a case of scrotal hypospadias, and succeeded in getting a fairly satisfactory anterior urethra, but had difficulty in closing the perineal fistula. Ombredanne has devised an operation which appears to give excellent results.

Epispadias.—When the urethral opening is on the dorsum of the penis, the deformity known as epispadias, the condition is much more disturbing and more difficult to correct than cases of hypospadias. This malformation occurs in both male and female children, although rarely in the latter. I have seen and operated upon one case of epispadias in a woman. She was an adult who had had incontinence all her life and upon whom various plastic operations had been performed. In this case I made a ureteral transplantation into the large bowel and the patient has been very comfortable ever since the operation was performed, a period of seven years. No condition is worse than incontinence, and any form of treatment which does not control this is not satisfactory. If attempts at plastic surgery fail, ureteral transplantation should be resorted to.

Undescended Testicle.—Undescended testicle is quite a common condition which may be either unilateral or bilateral. When both testicles are undescended, the individual is sterile. Recent investigations have shown that the sterility in these cases is due to the fact that the temperature of the testes in their abnormal location is constantly higher than it would be if they were in the scrotum.

The operation for the correction of this condition is not difficult for the experienced operator, and the results obtained are splendid. As a rule the Bevan operation is most successful, and favorable results from the Ombredanne operation have been reported. We have had 49 cases of undescended testicle, sixteen of which were bilateral. We have also had three cases of ectopic testicle in which the testis was found lying in the perineum.

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DEFORMITIES OF THE BLADDER AND URETHRA

Exstrophy of the Bladder.—Exstrophy of the bladder is undoubtedly the most unfortunate of congenital anomalies. As the result of a persistent open blastopore, the anterior wall of the bladder and the overlying anterior abdominal wall are lacking, so that the posterior wall of the bladder bulges forward. The pubic bones are widely separated, the testes are undescended, the urethra is epispadic, the penis flattened and badly deformed and in the female the clitoris is divided. The condition occurs about once in every 30,000 births. We have seen a number of these cases and have operated upon sixteen cases.

Unless the condition is corrected, a person so afflicted is doomed to a miserable existence both socially and economically. Children with exstrophy of the bladder cannot go to school or associate with other children. These individuals often have a waddling gait due to the separation of the pubic bones. In one of our cases carcinoma of the bladder had developed as the result of irritation by a metal contrivance used to catch the urine.

Formerly plastic operations devised to remedy the defect in the bladder were in vogue; but now it is quite generally accepted that the incontinence is the logical point of attack. The only way by which this can be controlled and the social status of the patient re-established is by ureteral transplantation.

Diverticulum of the Bladder.—A diverticulum of the bladder is occasionally reported as a congenital malformation, the condition being considered congenital because the bladder appears to be normal and the opening of the neck of the diverticulum into the bladder is circular and very smooth. It may be that this condition sometimes occurs congenitally. We have not seen a case, however, in which we felt that the diverticulum was embryonic in origin. Even in the cases in which the etiology was obscure, some pathological condition was present in the posterior urethra or the neck of the bladder which could account for the back pressure and the resultant diverticulum.

Congenital Valves of the Posterior Urethra.—A fact which seems not to be sufficiently appreciated is that congenital valves of the posterior urethra are the most common cause of urinary obstruction in male children. This possibility should always be kept in mind when one is investigating cases of enuresis, incontinence, frequency, pyuria, and anemia in children.

Unfortunately these patients too frequently are not brought to the urologist until symptoms of extreme renal destruction have developed, namely: uremia, indigestion, anemia, and malnutrition. Examination in these cases usually reveals marked bilateral hydro-ureter and hydronephrosis. If the condition of the patient is due to congenital valves of the urethra, incontinence and difficulty in urination will have been present since very early in life. Urethroscopy, urography, a search for residual urine and renal function tests help in making the diagnosis. An x-ray examination of the spine should be made to rule out spina bifida.

The treatment of congenital valves of the urethra depends upon the degree of the malformation and the severity of the symptoms. These so-called valves are vestiges of the urogenital membrane which tend to obstruct the outward passage of the urine, but may not interfere with the passage of a sound into the bladder. There is no doubt that small valves are frequently broken down by the physician in cases in which the diagnosis of stricture is made. The patient may be completely relieved by the passage of the sound; the valves, however, are apt to reform after such a procedure as the result of ulceration and reorganization. Well-developed valves markedly retard the passage of urine. They respond best to the urethral punch operation or may be destroyed by fulguration with the d'Arsonval current.

We have had two cases of congenital valves of the urethra.

In one case the patient, who consulted us three years ago, entered complaining of paradoxical incontinence, anemia, indigestion, and loss in weight. He had residual urine amounting to 1,300 c. c. and marked dilatation of the bladder, ureters and renal pelves. Decompression and drainage were instituted, followed by a punch operation, and in the course of two years the residual urine was reduced to 120 c. c. and the patient had almost completely regained his health.

We have seen another case, that of a young child, in which nothing but a suprapubic cystotomy could be done at the time of operation, and the bladder had to be continuously drained. This patient has had bladder drainage for about one and one-half years. The ureters and kidney pelves, which at first were markedly dilated, have decreased considerably in size, and the bilateral ureteral reflux which was formerly present has now disappeared. Later on, treatment of the posterior urethra will be instituted.

In these cases in which extreme renal insuf-

ficiency is often present, proper drainage may bring about considerable improvement, may almost, we might say, accomplish a cure, if the kidney is given time to improve before radical operation is undertaken. In other words, the method of treatment in these cases is quite similar to that of prostatic hypertrophy in old men.

Together with cases of posterior urethral valves should be considered cases in which spina bifida sclerosis has produced pressure on the lower cord with resultant paresis of the bladder. These patients present the same appearance as those with obstructing posterior urethral valves, but urethroscopic examination will reveal the absence of obstruction and the presence of a relaxed bladder neck, and an x-ray examination will disclose the spina bifida. In these cases cure may follow laminectomy with removal of the sclerotic bands.

Hypoplastic Kidneys.—In this connection must be considered hypoplastic kidneys, which are also termed "infantile kidneys." Their diagnosis is made from the following signs: the observation on the plain roentgenogram of a small kidney shadow with a small pelvis, and the appearance of the dye in a phenolsulphonephthalein function test at the normal time, but in a quantity which for the given period is markedly below normal. These hypoplastic kidneys are very prone to infection.

A third type of kidney, one which is not a congenital anomaly but must be kept in mind in making the differential diagnosis because its characteristics very closely resemble those of hypoplastic kidney, is the atrophic kidney which results from chronic pyelonephritis. This condition is diagnosed by the observation of a very small kidney shadow on the plain roentgenogram, by the finding of a lowered kidney function, the dye appearing later than normal; and by the pyelographic picture of a pelvis which is slightly smaller than normal, with calices which are irregular in shape and often show constrictions. In a case of atrophic pyelonephritis there is almost always a history of severe renal infection, and at the time of examination both kidneys are often found to be infected. We have had five cases of chronic atrophic pyelonephritis, and the operative results have been quite satisfactory.

Polycystic Kidneys.—A congenital malformation of the kidney which is more common than those already cited is the so-called polycystic kidney. This is nearly always bilateral. If the process is due to an embryological defect, microscopical in nature and involving most of the secreting units of the renal cortex, all surgical attempts at cure are necessarily useless. Since the disease involves the major part of the renal cortex and is not merely a superficial process, the Rosen, or decompression, operation in which the operator punctures as many of the retention cysts as possible, is of little benefit except to relieve the pain caused by pressure from the cysts. Furthermore, secondary hemorrhage or infection may occur as a result of such operations, and may make the condition of these handicapped patients worse, or may even bring about premature death.

There seems to be some familial predisposition to the disease, since parents and children are often afflicted. We have had one such case in which two brothers had the same disease.

Polycystic disease of the kidneys is truly an unfortunate disease because of its incurability. Frequently the patient has no idea what is causing his trouble and the condition is discovered when he is refused life insurance because of the finding of albumin in the urine, or because of the accidental discovery of a mass in the abdomen. In some instances, however, renal colic occurs as the result of the passage of a blood clot or stone, for these kidneys are somewhat prone to infection and the formation of calculi. Hydronephrosis of varying degree is usually present and in some instances it may be so pronounced as to cause pain.

In one case which I observed over a period of nine years the kidneys were enormous, extending to the iliac crests.

Congenital Hydronephrosis.—We do not believe that congenital hydronephrosis is a distinct entity in spite of the fact that it may be found in infants. We feel rather that this condition is secondary to some obstruction which is infra-renal in position and either organic or neurological in nature.

The dilatation may be confined to the kidney pelvis, or there may be an associated hydroureter, the so-called "megalo-ureter" described by Caulk. Most writers have described these cases of dilated ureter as congenital in origin, but we feel that they might be due to a stricture, be juxtavesical in origin, or to infection involving the intramural portion of the ureter and

causing induration and improper functioning of the corresponding ureteral orifice.

Congenital strictures of the ureter are situated most frequently at the junction of the ureter with the bladder, but in about one fourth of the cases they may be found near the kidney. They are due to the faulty absorption of the central embryonic cells which fill up the lumen of the embryonic ureter.

Congenital Renal Anomalies. — These are caused by the improper division of the ureteral bud as it proceeds cephalically.

(a) Bifid pelvis is the simplest form of renal anomaly and is of very little significance except in certain surgical aspects. For instance, a stone may form in one part of a bifid pelvis and may cause its destruction by dilatation, but the other part of the pelvis may be comparatively normal. In such cases a heminephrectomy may be performed. We have had three cases in which heminephrectomy gave satisfactory results: two cases of infected localized hydronephrosis and one case of stones with pyonephrosis.

(b) An anomaly which is less simple is the true double renal pelvis, or fused kidney. In such cases, since the ureter is either double or divides before it reaches the kidney tissue proper, the renal substance may or may not show a line of demarcation between the two pelves; in other words, a line of fusion may or may not be present.

Braasch has observed one case in which there were three renal pelves, the pyelogram in this case giving the impression of three large calices joined together.

In these cases the ureter may divide at any point between the kidney and the bladder, or two ureters may enter the bladder at different points on the same side. It seems that of the two conditions the double ureter is less apt to cause disturbance than the bifid ureter, as the junction of the two portions of the ureter is apt to have the same effect as a stricture and to cause hydronephrosis.

We have had one case in which a bifid ureter caused renal colics and attacks of hematuria. In another case a calculus was passed from one half of a double kidney and succeeded in progressing as far as the junction of the bifid ureter. Here it lodged, became larger, and the kidney was finally destroyed as the result of back pressure and secondary infection.

As we have said before, duplication of ureters or of pelves, or in fact any anomaly of the upper urinary tract, seems to predispose to trouble. A condition which frequently occurs in these cases is vesical cyst, that is, a slight dilatation of the intramural portion of the ureter due to atresia. The continued ureteral peristalsis then produces a hernia of the lower end of the ureter into the bladder.

Dystopic Kidneys.—Very often kidneys are anomalous in respect to their position. Dystopia may result in the fusion of the two kidneys. Occasionally the so-called unilateral fused kidney may be found to be very low in position. The term "dystopic" is applied to such cases in contradistinction to "ectopic," because the kidneys have always been in an abnormal position. Such a kidney may contain one pelvis and one ureter, or it may have two pelves and two ureters, or a bifid ureter.

Occasionally the orifices of the ureters may be normally situated, but one ureter may cross over to the other side to a solitary fused kidney. Six cases have been reported in which this condition was present, and we have recently operated upon such a case, which makes the seventh. In our case there was a large infected hydronephrosis of the lower half of a solitary unilateral fused kidney. Heminephrectomy was performed and the patient, a boy of six, had a moderately stormy convalescence, but eventually made a good recovery.

Patients with dystopic kidneys are somewhat handicapped. Hydronephrosis is apt to develop, stones frequently form, and occasionally, as a result of visceroptosis, certain organs press upon the kidney and cause renal pain. If these dystopic kidneys are in a fixed position within the pelvis or against the back, severe pain is apt to result.

In one case, as a result of visceroptosis, a Riedel's lobe of the liver pressed upon an atrophic and distorted right kidney, which was lying on the edge of the bony pelvis. Nephrectomy had to be performed in order to correct the condition, and although hydronephrosis and a moderate interstitial sclerosis were the only pathological conditions present, the patient gained 20 pounds as the result of securing relief from the severe pain.

These dystopic kidneys may be extremely difficult to remove. The blood supply does not correspond to that of the normal kidney, but comes from the vaginal vessels, the iliacs, or elsewhere. Furthermore, because of the fact that they are quite firmly fixed, they cannot be

delivered, and the operation must therefore be carried to the kidney. Frequently it is necessary to perform an intracapsular nephrectomy. I might add that in all these pelvic types of dystopic kidney in which the organ is quite fixed, intracapsular nephrectomy is very easily performed, while extracapsular nephrectomy may be very difficult.

Supernumerary Ureters.—Occasionally a ureter coming from an otherwise normal kidney, from one half of a double kidney, or from a dystopic kidney, may empty into the urethra, vagina or the rectum. In such a case it is called a supernumerary ureter. In such a condition the patient may complain of incontinence or of watery stools. The corresponding kidney is often destroyed as a result of obstruction and infection.

Horseshoe Kidney.—A fairly common type of renal anomaly is the horseshoe kidney. This fused kidney is almost always situated below the normal kidney level, lies closer to the spinal column than does the normal kidney, and is usually joined at the lower poles, very seldom at the upper.

The condition may often be discovered by the careful study of a good roentgenogram, especially if the isthmus contains considerable parenchyma and can be seen to cross the spine. The renal shadow, as previously stated, is closer to the spine and lies lower than the normal renal level. Furthermore, the lower poles, the portion of the kidneys which is most clearly visible in a roentgenogram, will not be seen in their usual location.

The condition is usually very easily diagnosed by pyelography, as it gives a distinctive pyelogram: the calices point medially instead of laterally; the ureters lie closer to the spine, turn inward instead of outward in their upper portion and empty into the kidney pelvis from an anterior or superior point, and lastly, hydronephrosis is always present, involving the pelvis proper. The degree of the hydronephrosis varies and its presence is due to the fact that the ureters do not enter the renal pelvis at its most dependent part and thus do not drain it well.

These cases are very apt to be complicated by hydronephrosis, infection and stones. We have had 18 cases of horseshoe kidney, in five of which stones were present in the kidney pelvis and in one case heminephrectomy was done.

Benign tumors have been resected from horseshoe kidneys and there is one report of a case of horseshoe kidney which was resected for renal tuberculosis with a resultant cure (Lazarus). As a rule, however, heminephrectomy in the case of a tuberculous horseshoe kidney is a dangerous procedure, as the disease is very often spread by way of the subcapsular lymphatics. Malignant disease in a horseshoe kidney is, of course, a condition even more unsuitable for resection.

From this report we may conclude:

(1) That anomalies of the genito-urinary tract are not uncommon;

(2) That they may cause symptoms which are often attributed to other conditions; and

(3) That correction by surgical operation is the only method for relief.

DISCUSSION (*Abstract*)

Dr. A. J. Crowell, Charlotte, N. C.—I am sure we all heartily agree with Dr. Lower in two statements made in his paper: first, that a diagnosis of malformations of the genito-urinary tract is possible in practically every case, whether they are in the lower or upper urinary tract. It is easy in the lower, but it is frequently necessary to repeat our investigations several times before we definitely decide upon malformations of the upper urinary tract.

The second point with which we agree, is that attempts to correct minor defects or deformities in the lower urinary tract, such as that done for glandular hypospadias, is meddlesome surgery. In penile hypospadias, I agree with Dr. Lower that it is often unnecessary to operate, but in the perineal type plastic operation should be undertaken. His experience in the transplantation of the appendix in these cases is interesting. I do not recall ever having seen a case of epispadias except in exstrophy of the bladder but where there is incontinence and one is unable to control it by plastic operation, undoubtedly the ureters should be transplanted into the rectum.

I have never seen a case of diverticulum that I thought was congenital, but agree with Dr. Lower that if we discover diverticula in young children we shall find posterior urethral valves, or some obstruction, that produced the condition. These posterior urethral valves are perhaps more frequent than is suspected. Every case of incontinence and chronic urinary retention in children should be investigated carefully, not only for nerve lesions but for posterior urethral valves. I am equally certain that congenital hydronephrosis does not exist, and that when hydronephrosis is found in the infant it is the result of urethral obstruction.

I have seen a number of cases of polycystic kidney, and the report made by Dr. Crawford before the North

Carolina State Medical Society, in 1922, demonstrated conclusively to my mind that the condition is familial. Osler and other observers had previously called attention to this fact, but I had seen no such positive proof of it as was offered by Dr. Crawford. The condition can usually be ascertained by careful observation and investigation. As Dr. Lower said, operation is meddlesome surgery and should be left undone.

The subject of anomalies of the ureters and kidneys is a large one. I do not think I have ever seen a case of either without kidney infection. Operation can be only palliative if both kidneys are involved, but may be radical if only one is affected and the kidney function is largely destroyed.

Dr. H. W. E. Walther, New Orleans, La.—In cases of exstrophy of the bladder one problem is when to operate. I now have a male patient aged fourteen months in my service with bladder exstrophy. The family and the home physician are anxious to have something done. The child is in excellent condition, but I feel that he is too young to do much at this time. At what age would it be most practical to operate upon this child? I should value Dr. Lower's opinion in this regard.

Dr. Guy L. Hunner, Baltimore, Md.—I am entirely in accord with Dr. Lower in his first two propositions, but it would not do for me to come to a urological meeting and not throw a dissenting note into the program, so I must disagree with Dr. Lower on his third proposition, that the malformations of the upper tract are necessarily operative. I will cite the picture of the one case Dr. Lower showed, that of the hypoplastic kidney. The lower end of the ureter on the left was not shown, but the upper end was shown and to my mind showed too large a lumen to be normal. The pelvis of that kidney while apparently normal in its outline, was decidedly large for the size of the kidney, and I think this was due to an obstruction at the lower end of the ureter, and that the kidney need not have been removed.

I am treating now a case of bilateral hydronephrosis in a woman with congenital cystic kidneys. She is in good health because we have been keeping up ureteral drainage.

Many of the horseshoe kidneys show ureters with too large a lumen. Passage of an ordinary catheter will not show whether stricture is present or not, but if the case is properly investigated ureteral stricture will be found, and the patients come to us because of trouble set up by this condition. I have more than fifty such cases, in which the slides show these conditions, and in which satisfactory results have followed stricture dilatation. The treatment is not necessarily surgical. If there is an obstruction in the lower ureter you can remove this and relieve the symptoms without surgical interference in many instances.

Dr. Monroe Wolf, New Orleans, La.—A condition which Dr. Lower did not mention is that due to anomalous renal vessels.

Recently I had two cases which presented this anomaly, at Charity Hospital, one with an aberrant renal artery to the lower pole of the kidney causing a uretero-pelvic kink with stone. In this case the vessel was clamped, cut and ligated, pyelotomy being done for removal of the stone. The patient made an uneventful recovery. The second case was a young man, with a history of illness of only two weeks duration, who presented a massive hydronephrosis caused by several large veins. I was forced to resort to nephrectomy in this case, with an excellent recovery.

Dr. Bransford Lewis, St. Louis, Mo.—It was not my impression that the polycystic kidneys are beyond all surgical relief. A few years ago, Dr. Lund, in Boston, showed several cases in which he had exposed the kidney, made multiple punctures in the cysts, and expressed himself as being well pleased with the results. I have never had an opportunity to do this. I wish to hear the opinion of Dr. Lower in this point.

Dr. Lower (closing).—Operation in cases of exstrophy of the bladder can be done at any time after the patient has gained good control of the anal sphincter. If operation is done too early, the child suffers from incontinence of feces and we get no thanks from the parents. We are always urged, in these cases, to operate as early as possible, but I think in the average case five years is the youngest age at which operation should be done. The parents want not only a functional but also an anatomic result, a perfect product, and it is not always possible to deliver that.

The method which Dr. Hunner uses is an operation, though not necessarily a cutting operation, and as he does it, it is not a bungling operation. I am not sure about the kidney cases which he thinks should not have been operated upon. It may possibly be true that drainage should have been continued longer. I think there is something which he does that benefits these patients, but I am not certain that it is the dilatation.

The point brought up by Dr. Wolf is one which I did not have time to mention. Formerly, we believed that if a kidney became hydronephrotic it was not always worth an attempt to save it. Two patients have recently reported to me in whom I had simply divided the aberrant blood vessel for hydronephrosis, and they have had no symptoms since the operation, in one case, fourteen years ago, and in the other, seventeen. If the hydronephrosis is not infected, I think it is well just to divide the vessel, for that kidney may be called upon at some time to take over the function of the other kidney, and it will be able to do so. It is a question whether we should sacrifice as many kidneys as we formerly did, because of the presence of aberrant blood vessels.

Many polycystic kidneys have little function, but seem to carry on and do their work satisfactorily. I do not believe that puncture of the individual cyst has any curative effect, but it does occasionally relieve symptoms of pressure. I have patients whom I have operated upon for polycystic kidneys who are still living, and I think they are still living not because of what I have done but in spite of it. I have never seen polycystic kidneys occur in five generations, but in several of my cases there has been a familial history of kidney trouble in three generations, and from the description of the symptoms I believe that all these individuals had polycystic kidneys.

THE EPIDEMIOLOGY OF UNDULANT FEVER*

By CHAS. N. KAVANAUGH, M.D.,
Lexington, Ky.

Although in Europe the relation of Malta fever in man and in goats has been recognized for a long time, it is indistinguishable clinically from that disease now prevalent in the United States contracted from hogs and cattle and known as undulant or Malta fever.

In 1886, Malta fever was proved to be a distinct infection by Bruce, who found the specific micro-organism, the *Micrococcus melitensis*.

Bang, in 1897, described the cause of infectious abortion in cattle under the name *Bacillus abortus*.

More recently the reported incidence of Malta fever in localities in which it had not been previously observed indicates a wider geographical distribution than we formerly supposed it had.

Malta fever in man was first described in the United States by Craig, in 1903, with *Brucella melitensis* as the infecting agent.

Endemic Malta fever was reported in the Southwest, where goat raising is an important industry, by Gentry and Ferenbaugh in 1911, and by Yount and Looney in the following year.

Evidence pointing to possible *Brucella abortus* infection in man was first presented by Larson and Sedwick in 1913.

Evans, in 1918, determined the close relationship between *Brucella abortus* and *Brucella melitensis*, showing them to be so similar as to be indistinguishable morphologically, culturally or even by ordinary agglutination tests.

The first cases of Malta fever in South Africa ascribed to abortus infection were reported by Bevan in 1921. By March, 1925, thirty-five cases had been reported.

Watkins and Lake reported an epidemic of Malta fever in Arizona in 1922, with goat milk as a source of infection.

The first case on record of Malta fever not traceable to infected goat's milk, caused by an organism definitely determined to be the abortus variety of *Brucella melitensis*, was described by Keefer in 1924.

Reports of Malta fever of bovine origin began to appear in the Italian literature early in 1925.

Stuart, in 1925, reported one case of abortus infection from Palestine.

Carpenter, in 1926, reported the first proven cases of undulant fever in man due to *Brucella abortus*. In these cases the infection was directly traceable to the use of milk containing virulent *Brucella abortus* organisms.

In 1924, De Korte recognized a case in South Africa, a man infected while attending an aborting cow. Orpen also reported a case from South Africa in 1924. In 1926-7 cases were reported by Belyea, Chester and Bailey, Kampmeier, Scott and Saphir, and Warren, Smith and Linder.

In 1928, Hardy made an epidemiological study of 78 cases in Iowa.

The occupation determined in 83 cases reported by Hardy and 27 reviewed by Kern are as follows: farmers 45, farmers' wives nine, students in bacteriology two, students four, packing house workers six, housewives (not on farms) ten, mechanics three, insurance agents two, and one each of the following: farmer's daughter, butcher, tractor manager, meat inspector, laboratory technician, private secretary, battery inspector, student nurse, shipping clerk, army officer, school boy, golf course worker, college dean, physician, attorney, nurse, druggist, veterinarian, merchant, bookbinder, buttermaker, ice cream worker, fisherman, imbecile. In 16 cases reported by Orr and Huddleston, four were farmers, three mechanics, three school children, two insurance brokers, two housewives, one dairyman and one merchant. The incidence in farmers is high because of the consumption of raw milk, the contact with abortion products of cows and hogs, as well as carcasses of slaughtered infected animals.

In the Hardy and Kern, Orr and Huddleson groups there were 88 males and 27 females. The marked male preponderance is due, in part at least, to the mode of infection.

In this same group age figures were available in 104 cases.

Following is the number of cases of undulant fever reported by states for the years 1927 and 1928:

States	1927	(a)1928
Arizona	5	1
California	14	2
District of Columbia	2	....
Georgia	....	2
Illinois	5	....
Indiana	1	....
Iowa	14	4
Kansas	3	5
Maine	....	1
Maryland	2	2
Michigan	26	....
Minnesota	8	6
New Jersey	2	....
New Mexico	2	....
New York	21	....

*Read in Section on Public Health, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Ohio	1	1
Pennsylvania	2	3
South Carolina	...	1
South Dakota	1	...
Tennessee	...	1
Virginia	2	...
Wisconsin	1	...

(a) Figures for 1928 are for 6 months ended June 30.

The oldest was 73 years of age and the youngest seven. It is obvious from the series that, although children under seven are frequently exposed to this infection through milk, they apparently have a high immunity to the organism.

Evans identified as variety abortus, strains isolated from human sources in Maryland, South Dakota, Connecticut and New York; from bovine sources in Maryland, Wisconsin, Michigan, Minnesota, New York, Connecticut, Iowa and Indiana; from porcine sources in Illinois, Iowa, Missouri and Colorado. Strains of variety melitensis from human sources were isolated in Arizona and Texas; from a bovine source in Maryland; from an equine source in Iowa.

In Mediterranean countries Malta fever is contracted from goats by consuming infected milk or cheese, or by handling infected goat meat or from contaminated soil or dust. In this Country the same chances for the transmission of the disease from animal to man are obtainable.

In Kern's group ten patients were known to have used raw infected milk. Nine others used raw milk, which was not proven infected. Contact with aborting cows caused three cases. There were two possible laboratory infections; contact with carcasses accounted for four cases.

Kampmeier reports six cases. Three of these originated in Michigan, infection no doubt from bovine source; the remaining three were in Utah, with goat milk as the presumable source of infection.

In Hardy's series there were 52 cases in which the evidence indicates that the infection was acquired from cattle. This evidence includes the history of dairy herds, serological examination of cattle, and the absence of any other probable source. A second group in this series includes 11 cases in which the evidence indicates that the infections were acquired from hogs. In these cases there was knowledge of repeated contact with infected hogs or pork and satisfactory evidence which freed the cattle from suspicion.

Sensenich and Geardano reported seven cases from Indiana in which the source of infection was presumably cow's milk. Of the cases reported by Orr and Huddleson, all had been using cow's milk in one way or another and had consumed raw milk.

The urine is the chief path by which the organism leaves the patient. The organisms have been directly observed in the feces of man on only one occasion. Milk maids frequently contract the disease in milking infected goats. Cheese furnishes another source of infection. In fresh cheese the micro-organism will retain its vitality sometimes for fourteen days. Sergent reports ice cream made from infected milk as a source of infection in Algeria. Individuals have acquired infection from direct contact with the sick, probably generally from soiled bed linen or urine through hand to mouth infection.

Huddleson points out that *Brucella abortus* is rarely present in milk of all the cows of a herd, and, when found, is rarely in numbers over 500 per c. c. except at the drying-up period, when many millions per c. c. may be found in the milk from an infected udder. Evans suggests that there exists some unknown factor "that prevents undulant fever from becoming such a common disease in temperate climates as it is in sub-tropical countries."

The mode of transfer of the organism from the infected animal to man is often difficult of proof. In Hardy's series, in 25 cases there had been no direct contact with livestock and the evidence suggested that the organism was transmitted through raw milk or cream. It also was accepted that, in the case of the packing house workers, the organism was acquired either from infected meat or excreta and gained entrance through the injured or unbroken skin, or by way of the digestive tract. The same would hold true for the other cases in which the infection was acquired from hogs. Dairy products used as food, or contamination with infectious excreta from livestock, were possible modes of transfer in the remaining cases.

There is no characteristic clinical picture of abortus infection. Its irregular course, variability, and indefinite duration along with symptoms which are inconstant and confusing, will serve to convince the reader of the futility of attempting to diagnose the disease on a clinical basis alone. A differential diagnosis is almost impossible in the majority of cases without bacteriological and serological aid. This holds true even where the disease is known to be endemic.

It is without the scope of this paper to discuss the varied symptomatology, the technic of se-

rum diagnosis and the significance of agglutination tests.

In doing routine abortus agglutination tests on sera sent in for laboratory tests, public health and laboratory workers have been responsible for the recognition of the majority of cases of Malta fever. In 1913, Larson and Sedgwick, in complement-fixation tests with the sera of 425 children, found a more frequent occurrence of antibody for the abortus organism than a positive Wassermann. In 1924, Evans tested 500 sera from various Washington hospitals for abortus agglutinins and found at least one strongly positive (1 to 320); the patient was then found clinically to have the disease. In 1926, Carpenter examined the sera of 20 cases of undiagnosed fevers in New York State: five gave a positive agglutination reaction for abortus. Four of the patients were said to be suggestive clinically and one typical of the disease. Hull and Black (1927), in the Division of Laboratories, Illinois State Department of Public Health, did routine abortus agglutination tests on all sera sent in for a Widal test. Of 69 sera from fever cases with a negative Widal, five gave positive reactions in dilutions of 1 to 200 or greater, and one in 1 to 50. They were able to prove clinically the presence of the disease in four of the patients whose sera reacted positively. Hardy (1928), working in the Iowa State Laboratory, examined 783 sera and found 46 positive Widals and 56 positive Brucella agglutinations. Litterer, in Tennessee, obtained 13 positive abortus agglutinations in 1,200 sera submitted for Wassermann tests, an incidence of 1.08 per cent. McAlpine and Mickle, in a similar study of 10,157 Wassermann sera in Connecticut, found 0.6 per cent to give abortus agglutination in a dilution of 1 to 100.

During the past year the State Laboratories of Kentucky have agglutinated all sera submitted for the Widal reaction against *Bacterium tularense* and *Brucella abortus*. In this way ten unsuspected cases of Malta fever have been diagnosed serologically and later proven clinically. An epidemiological study has not been completed.

Surveys have shown that up to 90 per cent of herds are infected in some regions, and practically no region is free. A large number of cattle in the United States eliminate *Brucella abortus* in their milk, and many individuals who probably drink much milk do not contract undulant fever.

The universal adoption of prophylactic measures by the individual is remote. The use of pasteurized milk, the avoidance of raw milk or the boiling of raw (particularly goat's) milk, including certified milk, will protect.

Because of the high incidence of abortus infection throughout the Country an education campaign by public health organizations, agricultural colleges and clubs, and the press is essential for its effective control.

The problem of effective control of the infection in cattle is vast. In many cases where definite steps have been taken to control the disease in a herd, the results have been quite satisfactory.

Suggestions to be observed in controlling the disease in cattle taken from Kentucky Extension Circular No. 169 gives the reader an idea of the difficulties involved:

(1) Remember first of all that the cow is usually infected with the disease through the alimentary tract by eating pasture or other feed soiled with infected material of an aborting cow. If a cow aborts on pasture, remove her to the stable or yard at once and destroy the fetus and afterbirth and spray the place where she aborted with one of the coal tar dips, using 1 part of the dip to 30 parts of water; or the place may be covered with quick-lime.

(2) Burn or bury deeply the aborted fetus or afterbirth. If burying is resorted to, cover the calf and membranes with unslaked lime.

(3) Endeavor to isolate each cow before she aborts.

(4) The bull may be a source of infection. Hence, if he serves a cow which has aborted, his sheath should be irrigated with a solution of potassium permanganate in a dilution of 1 to 1,000 directly after the service and again before he is allowed to serve another cow.

(5) A cow that apparently calves normally but has a retained afterbirth should be regarded with suspicion. The afterbirth should be destroyed, as has been described, and the cow kept in quarantine and treated.

(6) A cow after abortion should be kept in quarantine until all discharge ceases, which usually requires from three to six weeks. Before she is returned to the herd, her rump and hind parts should be thoroughly sprayed with one of the coal tar dips, using 1 part of the dip to 30 parts of warm water. The litter of the stall should also be sprayed with the same material. The attendant should not be allowed to go from an infected to a clean stable without first wiping the bottoms of his shoes on a gunny sack soaked with a coal tar dip diluted as mentioned above.

(7) Haul all litter from the stall to a field on which no livestock is or will be kept until the material is plowed under.

(8) If a live calf is dropped before full time, disinfect the coat of the calf before it is allowed to run with mature heifers or cows.

(9) It is not advisable to breed a cow which has aborted inside of sixty days following abortion.

(10) The premature birth of a calf (slipping) is only one of a number of symptoms indicating infectious abortion. The presence of the Bang baterium is accepted as a confirming proof of the disease; therefore,

from each case of abortion (when possible) a bacteriological examination of the fetus, afterbirth or uterine discharge should be made.

(11) Other means at our disposal for the diagnosis of infectious abortion are so-called blood tests.

Karsten in Germany advises: (1) Blood agglutination tests in all animals in the herd, including the bull, at least once a year. Reacting animals are to be killed or segregated. (2) Newly-purchased cattle should be tested at once and, if pregnant, should be segregated until after delivery. Before being put in the common stable they should again be tested. (3) Cows which abort or are prematurely delivered should be segregated until proven non-infected. (4) In freshly infected herds in which less than 10 per cent of the animals are involved, the disease is eradicable by killing the infected individuals, repeated disinfection of stables and routine testing of the remaining cattle.

According to Stitt, the practical elimination of this disease from the naval and military hospitals of Malta by the boiling of the goat's milk used in these institutions, points to the most important measure for the control of this infection. In the handling of the infected goats he advocates their destruction.

SUMMARY AND CONCLUSIONS

(1) *Brucella melitensis variety abortus* infection is widely prevalent in cattle throughout the Country.

(2) The close relationship between *Brucella melitensis* of goats and *Brucella abortus*, occurring in cattle and hogs, is definitely established.

(3) The organism is pathological to man and produces a disease which is a distinct clinical entity.

(4) It is endemic in the Southwest, where its incidence is in direct ratio to the goat-raising industry.

(5) Children under eight years of age apparently have a high degree of immunity.

(6) Direct contact with infected animals and the commoner utilization of raw milk is the essential cause of undulant fever in the United States.

(7) Universal pasteurization of milk is essential for the control of abortus infection in man.

(8) Enough fundamental information concerning undulant fever is available for formulating effective methods for the prevention and control of the disease.

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DISCUSSION (*Abstract*)

Dr. R. E. Dyer, Washington, D. C.—As Dr. Kavanaugh said, undulant fever has been found in several states. Dr. Hardy's work in Iowa has been very instructive. This author has called attention to the hazard in packing house work and contact with infected animals on the farm.

Dr. C. W. Garrison, Little Rock, Ark.—May I ask how the laboratory workers contracted the disease?

Dr. Wm. Litterer, Nashville, Tenn.—In June, 1927, the Division of Laboratories, State Department of Public Health, of Tennessee, undertook an intensive investigation of undulant fever, tularemia and endemic typhus fever. These invesigations were prompted by the fact that many Widals were reported negative in cases in which the clinical histories simulated typhoid or paratyphoid infections. Since that time we have been testing for these three fevers routinely all bloods negative to typhoid or paratyphoid fevers, as well as all negative Wassermanns. Prior to our investigations, undulant fever was unknown in the State. As a result of 1400 sera examined, we found 16 cases of undulant fever diagnosed clinically, epidemiologically, and serologically. Of this number we were able to isolate the micro-organism directly from the blood in seven cases. The micro-organisms isolated proved to be the *Brucella melitensis* variety abortus. There were 40 cases in which we obtained very high agglutination tests to undulant fever but we were unable to get the clinical histories from the physicians. We have every reason to believe that these cases were suffering with undulant fever. In addition to the undulant fever cases, we were able, out of the 1400 sera examined, to "pick up" 37 cases of tularemia and ten cases of endemic typhus fever (Brill's disease). All of these cases were serologically and clinically confirmed. None of the cases, that is, undulant, tularemia and typhus, were diagnosed by the physician. None of our cases of undulant fever has been attributed to the drinking of goat's milk. All of them except three have received their infections from drinking milk from abortus infected cows. The three remaining cases received their infection from slaughter houses in which they attended and cleaned swine.

Dr. J. H. Janney, Indianola, Miss.—Every health department should be constantly on the lookout to satisfy itself that some of its cases diagnosed as typhoid are not undulant fever. This is the only way in which we can tell anything about the geographical distribution.

At the present time we must depend almost entirely upon the laboratory for a diagnosis. All state laboratories should be equipped to do agglutinations. This leads up to the important question, what is a significant agglutination. I presume there should be no doubt when the report comes back positive in dilutions of 1 in 640 or 1280, but what about 1 in 40 or 80 or 160? Do these agglutinations in low dilutions mean anything?

Dr. Paul Eaton, Augusta, Ga.—Is it safe for the laboratory boys to handle this organism, or would it be better for me to ask the hygienic laboratory to furnish me a killed culture?

Dr. David B. Lepper, Bluefield, West Va.—What is the thermal death point of the organism. I do not know exactly, but know that pasteurization will kill it.

Dr. G. Foard McGinnes, Richmond, Va.—For the past year the Laboratory of the State Department of Health of Virginia has tested for Malta fever all negative typhoid blood specimens.

To date we have made about 650 of these examinations and have picked up two cases. These two cases proved to be clinically Malta fever.

If the laboratory of each state department of health would follow a similar procedure we should be able, in a reasonably short period of time, to determine whether or not Malta fever is a public health problem in the respective states.

Dr. Ira Kleigler, New York, N. Y.—In view of the close serological relationship of the caprine, bovine, and porcine strains of *Brucella abortus* or *melitensis*, how does the ordinary public health laboratory differentiate them? Smith believes that the porcine variety of *abortus* is the most virulent to man and that man's infections are due to it. Before we actually indict the cow as the chief source of the infection we ought to have a simple means of identifying these strains.

Dr. Kavanaugh (closing).—The absorption agglutination test is used to differentiate the different strains. By this method Evans, working with forty-nine brucella strains, from human, bovine, porcine, equine and caprine sources, was able to divide them into seven serological groups. It is possible by these reactions, in certain cases, to state positively that a particular strain is one of *B. melitensis*, but it is not possible to state definitely that a strain is *B. abortus* alone.

A diagnosis in the majority of cases of undulant fever is difficult or impossible without clinical, serologic and bacteriologic evidence.

We are indebted to the laboratory workers, particularly those in the Public Health service for the discovery and recognition of the widespread distribution of undulant fever in the United States. Their opportunity to cooperate with the clinician has been greatly enhanced by the advent of tularemia, undulant fever and Brill's disease, particularly in the routine examination of blood from febrile patients sent in for the Widal test for typhoid infection.

The mortality is variously estimated at about 2 per cent. I believe with the increasing recognition of this disease that this rate will be found to be much higher.

Cultures of the abortus strain may be obtained from the Hygienic Laboratory at Washington, D. C. This culture can be handled with a fair degree of safety, which is not so with the melitensis strain. An attenuated culture of the *Bacillus tularense* can now be obtained from the same source.

SUBACUTE BACTERIAL ENDOCARDITIS DIAGNOSED TUBERCULOSIS*

By GEORGE S. SPENCE, M.D.,
Oteen, N. C.

This case is of interest because of its duration and the fact that the disorder was persistently diagnosed as pulmonary tuberculosis.

The patient, a white male, aged 29, was hospitalized in this institution on four different occasions between 1922 and 1928. He was also under observation and treatment in several other hospitals during that period. He was married and his wife and four children are living and well.

In the family history it was stated that his father died at the age of 55, the cause being unknown to the patient. His mother died at the age of 32, presumably from cancer of the stomach.

The patient had the common diseases of childhood. During his military service he was slightly gassed on one occasion and was ill for five weeks with influenza. He was discharged in apparently good health in 1919, and remained fairly well until 1922.

In 1922 he felt ill, had a moderate elevation of the temperature at irregular intervals, and lost weight. He was sent here for observation for pulmonary tuberculosis, but no pulmonary lesion was found. A systolic murmur was present, and the evening temperature was frequently 100° F. The blood picture at the time was negative, hemoglobin 90 per cent. He was kept here under observation for four months, during which time the temperature improved somewhat. He gained fifteen pounds and was discharged as not in need of treatment for tuberculosis.

In September, 1926, the patient was returned here, again for treatment of pulmonary tuberculosis. During the interval he had been in other hospitals, a few months in each, but no evidence of tuberculosis had been found. A blowing mitral systolic murmur was present. Skiagram of the heart revealed no abnormality. The patient showed marked pallor and his hemoglobin had dropped to 65 per cent. He was placed on iron for two weeks and the hemoglobin increased to 72 per cent, with 5,500,000 red cells. His temperature remained within normal limits. He gained eleven pounds, and, being symptom-free, was discharged after twenty-six days' observation as not in need of hospitalization for tuberculosis.

He returned here again in October, 1927, having been in one other hospital during the interval. On this occasion he was admitted because of recent hemorrhages, both pulmonary and rectal. Physical examination and the x-ray still failed to reveal evidence of pulmonary tuberculosis, although medium and coarse rales were heard at both bases. The mitral systolic murmur persisted. The pulse and temperature remained within normal limits. Marked pallor was noted. The hemoglobin was 58 per cent, with 4,150,000 red cells. During this period of observation the patient had some bleeding from both the lungs and the intestines, but no large amounts of blood were lost. Every effort was made to determine the cause of the anemia, which seemed entirely out of proportion to the amounts of blood lost by hemorrhage. Suspicion was aroused by the fact that, although there was no bleeding for long intervals, the anemia increased, the hemoglobin dropping 28 per cent, with 4,500,000 red cells. Repeated stool examinations were negative for parasitic infection. Numerous blood cultures also were negative. A proctoscopic examination after a rectal hemorrhage revealed a reddened mucosa, but no ulceration and no hemorrhoids. After studying the man for two months he was again discharged, not being in need of treatment for tuberculosis, and a diagnosis was given of severe anemia, cause undetermined.

He was then sent to another institution for study of the anemic condition. During his stay there, many blood cultures were taken and all proved negative, but the pulmonary and rectal bleeding continued. They reached the conclusion that his anemia was secondary in type and attributed it to tuberculosis and internal hemorrhoids. As a treatment measure for the anemia they gave him a blood transfusion, 500 c. c., which was immediately followed by a severe and rather prolonged reaction. He was made very ill and ran a high temperature for about three weeks after the transfusion. They requested that he be returned here for the treatment of pulmonary tuberculosis, and he returned in March, 1928. At that time he had an evening temperature of 101 to 102° F., and it was never normal for more than a few days at a time up to the time of his death. It was evident that the man was very ill. He was extremely pale, the pulse remained about normal, hemoglobin was 42 per cent, red cells 3,550,000, the blowing mitral systolic murmur was still present, there was considerable moisture in both bases, there was marked cardiac embarrassment, a pre-systolic murmur was heard on two occasions, and for the first time there was a strongly positive Wassermann reaction. The patient denied any source of infection, and careful examination failed to reveal any initial lesion. About the middle of March, a little over two months after the transfusion, general syphilitic secondaries appeared. Contact was made with the institution where the patient was transfused, the donor checked and found to have a positive Wassermann reaction. Mild anti-syphilitic treatment was instituted and continued search made for the cause of the anemia. Blood cultures were repeatedly negative until May 11, 1928, when the presence of *Streptococcus mucosus capsulatus* was demonstrated and a diagnosis of chronic septic endocarditis was made. The patient declined gradually from the time of the last admission and died on June 2, 1928.

At necropsy no evidence of tuberculosis was found. The heart was slightly enlarged, there were marked ulcerative lesions on the mitral valve, and some changes were found in the aortic and tricuspid valves. A culture of the heart's blood again yielded a growth of *Streptococcus mucosus capsulatus*. No hemorrhoids, ulcers or other abnormalities were found in the lower bowel, and no pathological condition was found in the other organs, except such minor changes as had been produced by the anemia and passive congestion.

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

BRONCHIECTASIS*

By H. T. Floyd, M.D.,
Oteen, N. C.

In about 25 per cent of the cases sent to this Hospital with a diagnosis of pulmonary tuberculosis, we are unable to confirm that diagnosis. Some of these have non-tuberculous disease of the lungs; others have no demonstrable disease of the lungs.

In the time at our disposal we can not attempt to cover the subject of diagnosis or of differential diagnosis in chronic pulmonary diseases. We shall merely present as briefly as possible two cases of bronchiectasis to illustrate some of our diagnostic problems and methods. Both of these patients were sent to the Hospital with a tentative diagnosis of tuberculosis.

Case 1.—This patient has a brother suffering with pulmonary tuberculosis. The patient is 35 years of age and a bookkeeper by occupation. For several years he has been in poor health, especially during the winter months. There has been no acute illness, but a gradual failing in health, occasional moderate fever, general weakness, and marked cough. Sputum now amounts to 4-6 ounces per day. It is rather thick; greenish yellow and not particularly offensive to the patient in odor or in taste.

(Presenting patient.) Note that he is well developed, quite well nourished, with no deformity of the chest, and he is not of phthysical habitus. There is moderate restriction over the lower half of the chest and we find that portion filled with medium and coarse rales. The upper half is clear. Many examinations of the sputum reveal no tubercle bacilli. A few fusiform bacilli and spirochetes have been found. The von Pirquet reaction is positive. You will note that routine x-ray plates show nothing indicative of disease except moderate fibrosis in the lower half. However, in plates after lipiodol injection we see considerable dilatation of the bronchi to the lower lobes. This type of case is usually bilateral and is the most frequent type of non-tuberculous bronchiectasis.

Case 2.—This patient dates his disability to a severe acute pulmonary infection while in the Navy. He is uncertain as to the diagnosis at that time. Shortly after he returned to duty from the illness, his ship was wrecked, resulting in exposure of the patient on the open sea for many hours. After that he was again extremely ill for several weeks. Since that time there have been repeated exacerbations with fever, malaise, marked cough and, intermittently, the raising of considerable quantities of thick sputum that more recently has become so foul as to cause nausea.

(Presenting patient.) Note that his chest is rather thick with fairly good expansion. Physical findings on the right side present no evidences of disease. Breath sounds over the left upper are rather feeble, the percussion note is somewhat impaired, and there are showers of medium rales over the upper half anteriorly. With these findings, of course, the burden of proof is on anyone who makes a diagnosis of non-tuberculous disease. Repeated examinations, even of specimens concentrated from great quantities of sputum, have revealed no tubercle bacilli. The x-ray plates, as you will note, are rather unusual. Our staff roentgenologist, without any knowledge of the clinical side of the case, called attention to these circular shadows near the left hilum and suggested that they were bronchiectatic cavities. Lipiodol injection in this case was unsuccessful because of a hyperirritable larynx. The von Pirquet reaction is negative.

The history, the negative sputum, the negative skin test, the appearance of the x-ray plates lead us to believe that we have here a non-tuberculous bronchiectasis involving the left upper lobe. This case is probably due to a pneumonia that did not undergo resolution, but has continued as a chronic suppurative process that has reached the present condition with dilated bronchi that serve as reservoirs for the extremely foul sputum that empties intermittently. This type of case is comparatively rare. But it is the type that presents the greatest difficulty in differential diagnosis.

Of course there are several other types of bronchiectasis as well as many other chronic pulmonary conditions which must be differentiated from tuberculosis. These two cases happened to be on the observation ward at this time and could be used to illustrate some of our procedures in arriving at a diagnosis.

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EDITORIAL DEPARTMENT

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THE BEST BODY WEIGHT

Medical heads of life insurance companies are rapidly taking a leading place among the students of preventive medicine. Every day added to the average life of an insured person is money to the companies; and the average insured is more than willing to aid them by extending his life period. The increasing popularity of weight and longevity statistics throughout the country is due to the compilations of the life insurance companies, which have shown that the average weight, like the average diet, or the average education, is a far cry from the ideal.

For long and efficient life, the best weight for a young person in the teens or twenties is ten or twenty pounds above the average. That is, if the youngster is to live long and be strong and efficient, he ought to be rather plump and well rounded; not lean and bony. While he is growing, he needs to be well nourished to insure the best development of all his mental and bodily powers.

These conclusions are borne out by the Medico-Actuarial Mortality investigation, which represents the consolidated experience of fifty leading American life insurance companies. The companies find that persons aged twenty to twenty-four at entry, live longest if they weigh twenty pounds above the average weight for persons of their height and age. Of course, those who are sixty to seventy pounds overweight, as well as those thirty to forty pounds underweight at this age are poor risks. But a youngster ten to twenty pounds underweight is just as poor a risk as if he were sixty to seventy pounds overweight.

Moving pictures have popularized the small, slim style of feminine figure. The lines of Venus de Melos, well-nourished, plump and beautifully rounded, have little appeal to young women of today. Venus de Melos would be regarded as too fat for the movie lot. The young girl wishes to be thin like her movie heroines, starves herself accordingly, and frequently even takes up activities which are bad for her, such as excessive smoking or coffee drinking, because she has heard that they will make her thin.

The young underweight person is undernourished, and undernutrition has as its corollary under-resistance, which may be temporary and secondary to a severe illness, or may be a constitutional matter consequent upon defective stock. Tuberculosis is the chief hazard in young underweights; also due to the lowered resistance, the young underweight is more liable to any of the acute infections; and debilitating troubles like anemia and pellagra can be expected in greater frequency. Overweight in the younger ages is a negative virtue, according to Dingman, of the Continental Casualty and Assurance Company.[1] It is favorable only because tuberculosis and debilitating diseases are less liable, and the credit temporarily overbalances the constantly mounting debit of proneness to degenerative diseases which are the great hazard of the older obese person.

For one who has reached the age of thirty to thirty-five, the best weight is just the same as the average weight. But as one grows older, he should not permit himself to gain a few pounds every year, as the average man regularly does. He should gradually reduce his weight until when he is fifty or fifty-five he is considerably below the present average weight for men of his height and age.

Early death is the lot of the fat man over forty years of age, but this is not usually brought home to him in a way which will lead him to control his gustatory sense. The allure of a thick, juicy, broiled steak, the soothing effect of creamed soup and a liberal slice of a rich pie, the happy feeling of distension and partial coma following a big dinner, are difficult for him to resist.

Beall some time ago offered a vivid explana-

1. Dingman, H. W.: Insurability. Prognosis and Selection. New York: The Spectator Co., 1927.

tion of the mechanism of the injury of excess fat, in a paper in THE JOURNAL on "The Parasitism of Fat".[2]

"In each pound of fat there are about 4500 feet of blood vessels, or five-sixths of a mile. Therefore, in 30 pounds of fat, the ordinary amount of excess fat in four-fifths of Caucasian adults, there are 25 miles of blood vessels, through which the heart has to pump blood every five-sixths of a second or less." One can readily see what an enormous extra load this must be upon an aging cardiovascular mechanism. According to Joslin, "Scales are to chronic diseases what thermometers are to acute diseases".[3]

"A lean dog for a long run," is ancient wisdom. The young should be warned against too severe dieting, and if possible taught the appreciation of health which usually comes with advancing years. The older man should be weighed and shown just where he stands on the insurance chart; just what chance he has for life and efficiency. He can then perhaps be induced to strive to grow leaner and lighter as he grows older. Thus may he increase his life span, and the average longevity of man.

THE MONOCYTE IN TUBERCULOSIS

Some time ago, in one of the popular science periodicals, appeared a description of the discovery by Dr. Florence Sabin of the presence in the blood of two kinds of cells, one of which fought on the side of the microbes in tuberculosis, and the other in defense of the infected person. The report was the outcome of some years of study in the Department of Anatomy of the Johns Hopkins University upon types of blood cells.

During the past two years, a number of hospitals over the Country have investigated the role of the two kinds of cells in the course of tuberculous disease. It is becoming apparent that an enumeration of them by the method of supravital staining can give information of importance in the diagnosis and prognosis of clinical tuberculosis. In 1925 appeared the study of Cunningham, Sabin, Sugiyama and Kindwall,[4] of the Hopkins, upon the monocyte in rabbits' blood after experimental infection with tuberculosis.

Since there are many healed cases of tuberculosis, the workers stated, the body must have a marked power to produce an immunity to this disease. Yet all attempts to develop an immune serum to combat advancing cases have failed. They offered a new concept of tuberculosis, as a disease which affects primarily a single strain of cells, namely, the monocytes.

The monocyte had been previously identified[5] as a large (10-15 microns) round cell, with an oval or slightly indented nucleus, usually eccentric, with a ring of granules near the indentation of the nucleus making two or three concentric circles, the rosette. It differs from another mononuclear cell of Sabin's classification, the clasmatocyte, by the arrangement of granules in the rosette and the arrangement of its vacuoles. In fixed smears it is not differentiated. Blackfan and Diamond differ with this last belief to some extent. It is derived from the reticular cell, and from it in turn come the epithelioid cell and the giant cell which is characteristic of animal tubercles.

The living tubercle bacillus injected into the body enters the monocyte, and its immediate effect is an inhibition of the motility of the cell. The monocyte shows none of the signs toward the engulfed tubercle bacilli which ordinarily indicate that material taken in is being digested. Apparently the bacilli remain alive in the cell and capable of multiplication, harbored by the monocytes instead of being destroyed by them. The bacillus so alters the cytoplasmic activity of the monocyte that the cell becomes a suitable medium in which it can live and multiply. It becomes a parasite within the cell. The production of epithelioid and giant cells from the monocytes is then stimulated by its activity, and there is an overproduction of monocytes in the connective tissues and an increase in the blood during the acute phase of the disease.

In a study of the disease in rabbits the normal numbers of blood cells, after supravital staining, were determined. It was found that the ratio of monocytes to lymphocytes is constantly about one to three. The ratio changes in response to tuberculous infection. In their reaction to injections of living tubercle bacilli, the rabbits could be divided into three groups. In the first group, the normal ratio of monocytes to lymphocytes was reversed and the mono-

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2. Beall, K. H.: The Parasitism of Fat. JOURNAL, 17:319, 1924.

3. Joslin, E. P.: Boston Med. and Surg. Jour., 186: 833, 1922, quoted by 1.

4. Cunningham, R. S., Sabin, F. R., Sugiyama, S., and Kindwall, J. A.: Role of the Monocyte in Tuberculosis. Bull. Johns Hop. Hosp., 37:231, 1925.

5. Sabin, F. R.: Studies of Living Human Blood Cells. Johns Hop. Hosp. Bull, 34:277, 1923, quoted by 7.

cyte count rose very high. In these cases at autopsy, miliary tuberculosis or a more extreme grade of widespread infection was found. The animals showed a very low resistance to tuberculosis, and this could be foretold by the increasing number of monocytes in the peripheral circulation.

In the second group, a rise in the number of monocytes was noted, but the lymphocytes were always higher. The monocyte-lymphocyte ratio remained low. The animals at autopsy showed either no tuberculosis or arrested tuberculosis. They had a high resistance to the disease.

In the third group, which contained much the largest number of animals, in the counts from day to day repeated shifting of the monocyte-lymphocyte ratio was found. In these animals attempts to build up a resistance alternated with periods of low resistance, with active and arrested phases of the disease. The periods of improvement in the blood picture, that is, of low monocyte count, corresponded with improvement in weight, and with other signs discernible at autopsy.

A very high monocyte count in the blood accompanied a malignant mononucleosis in the infected tissues. A moderately high monocyte count accompanied miliary tuberculosis and tissue mononucleosis of less intensity. A normal monocyte and high lymphocyte count were correlated with arrest of the disease. Pathologically, widely disseminated infected monocytes are found in the most severe lesions of tuberculosis. Surrounding of the tubercle by masses of lymphocytes is evidence that healing is taking place.[4]

That the same findings may be obtained from human blood has been elsewhere indicated. Rogers[6] studied a group of children with positive and negative tuberculin reactions in the New Haven Hospital. Young children were observed, known to have been exposed to tuberculosis, who gave a negative tuberculin reaction, and showed a low monocyte-lymphocyte ratio. Clinically and from the blood findings these had a high resistance to tuberculosis. In other cases an elevated monocyte-lymphocyte ratio, as in the rabbits, was accompanied by a low clinical resistance to tuberculosis. Modified monocytes, or epithelioid cells, were almost constantly present in the blood of cases of active tuberculosis, though they are not usually present in other common diseases or in healthy persons.

6. Rogers, P. M.: Study of the Blood Monocyte in Children with Tuberculosis. New Eng. Jour. Med., 198:740, 1928.

Blackfan and Diamond[7 8] have likewise confirmed the possibility of clinical application of this method of blood examination in human tuberculosis. In their cases of progressive, rapidly fatal tuberculosis, the percentage and absolute number of monocytes rose steadily, the lymphocytes fell, the increased monocyte-lymphocyte ratio and the presence of epithelioid cells in the peripheral circulation meant active tuberculous infection. An increasing monocyte-lymphocyte ratio signified extension of the tuberculous process; a reversal of this ratio, healing. One case with a negative tuberculin reaction was diagnosed tuberculosis on the blood count, the monocyte-lymphocyte ratio being 1:1.2, or too high. Twelve days later tubercle bacilli were found in sputum and feces and death from tuberculosis ensued in one month. The workers emphasize the importance of supravital studies in tuberculous disease.

Thus one sees again confirmation of the resemblance of animal and human reaction to a specific infection.

Among the impediments to the general use of the method is the fact that the technic of staining is difficult. Rogers[6] says that his results for the first year were discarded for technical reasons. Also monocyte increase occurs in occasional infectious conditions not due to the tubercle bacillus, and its failure to occur in a typical case of tuberculosis has been reported.[8] The supravital staining methods as described will undoubtedly give additional understanding of the course of the disease and will probably assume a place of importance in diagnostic laboratories.

TEACHING IN OBSTETRICS

Medicine, surgery, and obstetrics, are usually granted in medical college curricula as the three major subjects. The proper allocation of time among these, as well as among the minor subjects, is a matter for debate and careful study. The medical student should be prepared for the practice which later years will bring him, and should put emphasis during his student phase upon those conditions with which he will most frequently have to deal. Often the diseases com-

7. Blackfan, K. D., and Diamond, L. K.: Monocyte in Active Tuberculosis. Amer. Jour. Dis. Child., 37: 233, Feb., 1929.

8. Blackfan, K. D., and Diamond, L. K.: The Diagnostic and Prognostic Significance of the White Blood Cells in Active Tuberculosis. THE JOURNAL, this issue, p. 248.

monly met with are not the most interesting or appealing to him in medical school.

In a recent issue of the *American Journal of Obstetrics and Gynecology* appeared an address upon the teaching of obstetrics by Dr. Palmer Findley,[9] of Omaha, Nebraska, which carried the theme that far too much emphasis in medical studies is placed on clinical subjects which might better be shifted to graduate schools. In the majority of schools in this Country and abroad, he believes, the training in obstetrics is the weakest page in the curriculum. The theoretic teaching of obstetrics in America may be up to the standard set by other nations, but the facilities for clinical observation are woefully lacking in many American institutions.

In the general practice of medicine, according to Dr. Findley, obstetrics far exceeds general surgery in importance and is second only to internal medicine. In the report of the Committee on Maternal Welfare (1925) the statement is made that the services of the general practitioner are proportioned about as follows: internal medicine, 50 per cent; obstetrics, 35 per cent; minor surgery, fractures, life insurance, so forth, 15 per cent. A study of the curricula of medical schools shows that in actual teaching hours the ratio of obstetrics to general surgery, exclusive of surgical specialties, is as 4 to 18.[9]

Findley reports the countries which give obstetrics and gynecology combined equal recognition with general surgery as follows: Russia, Poland, Ecuador, and Argentina. In Germany, France, Norway, Sweden, Holland, Italy and Switzerland, he says, the allotment is nearly equal; while England, Scotland, Wales, Canada, Australia, Austria, Hungary, Mexico, China, Siam and Haiti give much more time to surgery than to obstetrics and gynecology, the proportion being about 2 to 1. In none of these countries, he says, is surgery given so large a proportion of the teaching hours as in the United States, where the ratio of surgery to obstetrics is in the neighborhood of 4.5 to 1.

Bass,[10] in an analysis of the practice of 480 Tulane medical graduates, found 303 general practitioners, 52 surgeons, 52 eye, ear, nose and throat specialists, 17 internists, 17 pediatricians, and 15 obstetricians. This is a rough indication at least of the tastes of Southern medical graduates. In an analysis of the visits of the general practitioners, Bass found that 15 per cent were for minor surgery, and 2 to 3 per cent for obstetrical work. About 16 per cent of visits were for respiratory diseases, and nearly 10 per cent for venereal diseases. From these data, it might be inferred that more time should be given in medical curricula to the minor respiratory infections, for which at present very little is being done.

The great mortality rate of childbirth in the United States is constantly brought before obstetrical gatherings. Whether this high puerperal mortality is due to insufficient obstetrics in the medical curriculum, to midwife deliveries, or to other remediable factors, is a question for further statistics, and for authorities on medical education to determine. It is undoubtedly a matter of great economic and racial import.

9. Findley, Palmer: The Teaching of Obstetrics. Amer. Jour. Obst. and Gyn., 16:611, Nov., 1928.

10. Bass, C. C.: Relative Proportion of Diseases and Conditions Treated by Our Graduates in Their Practice. THE JOURNAL, 21:1049, Dec., 1928.

Book Reviews

Pocket Atlas of Anatomy. By Victor Pauchet and S. Dupret. 306 pages with 297 plates. New York: William Wood & Company. Cloth, $4.00.

This deftly illustrated atlas possesses an advantage over other books of similar nature on account of its small size. It anticipates the need of the medical student in dissecting room, ward or operating room in that it may be carried in the pocket for ready use. There is no text and there are no legends, and one can review the facts of anatomy at once. Despite the pocket size of the volume, there is no omission of important gross anatomical facts.

Most of the illustrations are in colors, and there is an orderly sequence in the presentation of the dissected material. The regional lymphatic drainage of various parts of the body is cleverly presented. The drawings on the heart and the large blood vessels give a comprehensive picture of the anatomical relations to other organs. There are cross sections of upper and lower extremities as well as of the head and trunk. There is none, however, of the cerebrum; and the central nervous system is represented poorly.

The work, though abbreviated, is accurate and complete.

Urinary Surgery. By William Knox Irwin, M.D., F.R.C.S.E., Surgeon to Out-Patients, St. Paul's Hospital for Genito-Urinary Diseases, Endell Street, W. C.; Formerly Chief Clinical Assistant, Genito-Urinary Department, West London Hospital, and Clinical Assistant, St. Peter's Hospital for Stone and Other Urinary Diseases. Second Edition, Revised and Enlarged. 271 pages. New York: William Wood & Co. Cloth, $4.00.

This second edition of "Urinary Surgery," which formerly was called "Surgical Urology," is a small hand book which is best adapted for ready use by the student and general practitioner. It accomplishes well what it sets out to do. The urologist naturally would turn to a more exhaustive treatise on the subject.

Neurological Examination. An Exhibition of Tests with Interpretation of Signs and Symptoms. By Charles A. McKendree, M.D. Associate, Department of Neurology, College of Physicians and Surgeons, Columbia University. With a foreword by Henry Alsop Riley, M.D. 12mo. of 280 pages with 88 illustrations. Philadelphia and London: W. B. Saunders Company, 1928. Cloth, $3.25 net.

This book gives in detail the method of neurological examination used at Columbia, the Vanderbilt Clinic and the Neurological Institute, New York City. It embraces the history, the examination, the mental status and the laboratory tests. This plan has no particular virtues over numerous others and is, therefore, more or less incidental in the book.

The strongest parts of the volume and those which merit especial praise are those which are devoted to the reflexes and to the cranial nerves. Practically every known reflex is listed; the technic and significance of each being explained in a clearer manner than in most standard neurological text books. The section dealing with the cranial nerves is complete. The anatomy and function of each nerve is reviewed first. Then the method of its examination is given.

Though the subject matter is complete, the book is not voluminous. The author says just enough. It is well illustrated and written in a manner that is easy to follow. The reviewer considers it superior to most other books of its kind.

Handbook of Microscopical Technic. By various authors. Edited by C. E. McClung, Ph.D., Professor of Zoology, University of Pennsylvania. 510 pages with 43 illustrations. New York: Paul B. Hoeber, Inc., 1929. Cloth, $8.00.

It was with keen delight that the reviewer lingered along the pages of this excellent publication, for it is a privilege to chance upon a work on microscopic technic at once so thorough, yet so invitingly written.

The eminent authorities who have contributed the monographs, on account of their training in research and in teaching, give a unique presentation of the various methods used in microscopy, and their experience enhances the scientific value and authority of this work.

The first chapters are devoted to the methods and to the physical agents used for the study of fresh material. Then follow facts by Dr. Foot and Dr. Sabin on vital and supravital staining. The section on general botani-

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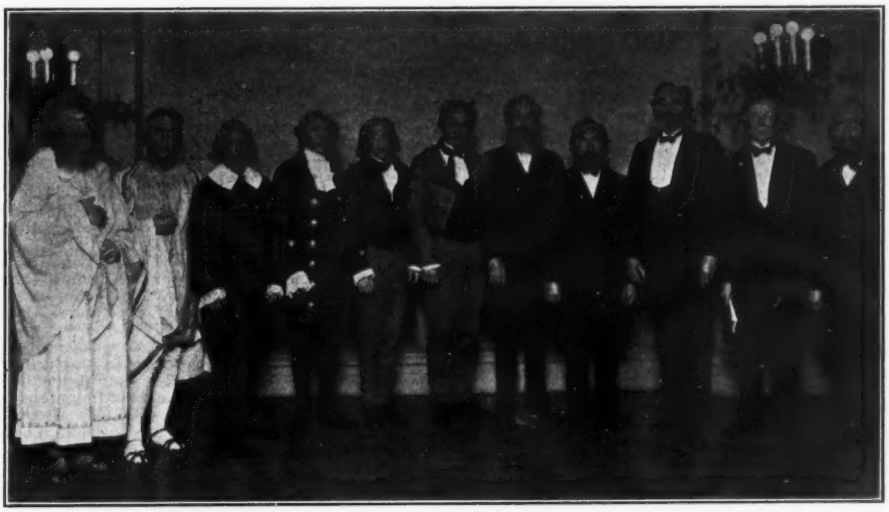


ELEVEN IMMORTALS*

These are the eleven immortals who visited the Fulton County Medical Society, Atlanta, Georgia, at its annual dinner on January 3. The physicians representing the various characters appeared in a pageant dressed to represent men famous in medicine from the time of Hippocrates to the present. Reading from left to right: Dr. O. O. Fanning, as Hippocrates; Dr. N. M. Owensby, as Claudius Galen; Dr. George Bachmann, as William Harvey; Dr. W. A. Selman, as John Hunter; Dr. Trimble Johnson, as Edward Jenner; Dr. Herschel Crawford, as Laennec; Dr. T. J. Collier, as Crawford W. Long; Dr. G. B. Adams, as Rudolf Virchow; Dr. E. C. Thrash, as Louis Pasteur; Dr. J. L. Campbell, as Joseph Lister; Dr. Theo Toepel, as Robert Koch.

When the time came for this feature the banquet hall was darkened and Father Hippocrates appeared at a side door in the spotlight, which followed him to the middle of the hall, where he stood on a platform and gave a talk of five to ten minutes, telling who he was and what he had done to deserve immortality. He then disappeared in the darkness on the other side of the hall. Galen next appeared in the same manner and so on with the others. The object of the entertainment was to refresh the memory of those present on some high lights in medical history. This is said to have been very impressive.

*Photograph from Rotogravure Section of Atlanta Journal.

cal micro-technic is contributed by Dr. W. R. Taylor. The chapters on embryological methods of staining blood cells are valuable for the painstaking exposition of tried methods yielding the best results. The matter for the study of intracellular substances of the connective tissue has been admirably covered by Dr. Mallory and Dr. Parker. There is a complete discussion of neurological technic and of methods of microscopic examination of protozoa.

The book is especially adapted to the use of the inexperienced worker requiring specific directions which he may apply to the general run of material, and to the experienced investigator seeking the latest and approved methods for the accomplishment of special technical results. Although there are occasional variations of statement and opinion among the different contributors, the work as a whole is above criticism and should appeal to students, pathologists and laboratory workers.

Tumors Arising from the Blood-Vessels of the Brain. By Harvey Cushing, Professor of Surgery, Harvard Medical School, Surgeon-in-Chief, Peter Bent Brigham Hospital, Boston, and Percival Bailey, formerly Associate in Surgery, Peter Bent Brigham Hospital; Associate Professor of Surgery (Elect), University of Chicago. 219 pages, illustrated. Springfield, Illinois: Charles C. Thomas, Publisher, 1928. Cloth, $7.50.

The book is the result of a careful study, both clinical and pathological, of these forms of tumors. For those interested in cerebro-spinal surgery it will be welcomed. It is too technical to be of use to the general physician except for the methods used in diagnosis which can be studied to advantage by all physicians.

The illustrations are good and carefully selected. A complete bibliography, foreign as well as American, is an added feature.

Lipiodol in the Diagnosis of Thoracic Disease. By F. G. Chandler, M.A., M.D. (Cantab.), F.R.C.P. (Lond.), Physician with Charge of Out-Patients, Charing Cross Hospital; Physician, City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E., and W. Burton Wood, M.A., M.D. (Cantab.), M.R.C.P. (Lond.), Physician with Charge of Out-Patients, City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E. 133 pages, illustrated. New York: Oxford University Press, 1928. Cloth, $3.50.

The authors are basing their opinions upon a large series of cases which have been correlated with the literature.

The manual presents this subject in six chapters. The first discusses the "Chemical Nature—History—Disposal —Therapeutic Value" of lipiodol. Chapter two is devoted to its uses in diagnosis, indications, limitations and contraindications; chapter three to technic, describing the authors' methods. Other methods of introducing lipiodol, dangers associated with it, interpretation of pictures, a table of references, and clear skiagrams as illustrations of the text, are also given.

Although brief, the book is in no sense elementary, and is a good presentation of the subject.

Southern Medical News

ALABAMA

Public health work in Alabama is beginning to show in the official records. According to the mortality statistics, the State had fewer deaths in 1927 from the more common diseases than in 1926.

Plans and specifications for the Atmore General Hospital have been completed and it is hoped to have the Hospital ready by April. It will be of 24-bed capacity.

The Jefferson County Sanatorium for Treatment of Tuberculosis has just received a $25,000 appropriation from the County.

The Monte Sano Baby Hospital, to be erected in Huntsville, will cost about $100,000.

Dr. Edward O'Connell, Birmingham, was elected President of the Medical Staff of St. Vincent's Hospital: Dr. H. R. Carter, Vice-President, and Dr. Miles A. Watkins, Secretary.

The Etowah County Tuberculosis Hospital, on Lookout Mountain, Gadsden, has elected Mrs. Dolly Morton Superintendent. Mrs. Morton, for the past two years, has been Director of the tuberculosis work of the New York City Health Department.

Dr. A. C. Jackson, Jasper, was elected President of the Walker County Hospital at the recent annual meeting.

Deaths

Dr. M. C. Thomas, Tuscaloosa, died January 11 from influenza.

Dr. Frank K. Williams, Jasper, aged 35, died November 3.

Dr. John Paschal, Hurtsboro, aged 52, died December 28.

ARKANSAS

Dr. W. T. Wootton, Hot Springs, announces the reopening of his office for the practice of medicine on January 1.

The Faulkner County Medical Society, at the meeting December 20, elected Dr. M. T. Smith, Conway, President; Dr. Jos. H. Downs, Vilonia, Vice-President; Dr. J. S. Westerfield, Conway, Secretary-Treasurer.

The new clinical building of the Leo N. Levi Memorial Hospital, Hot Springs, was opened to patients December 17. This is a charitable institution and is to be known as the Charles Steinberg Clinic. It is a one-story brick building and with the equipment cost $40,000.

Dr. G. G. Altman, Helena, has moved to Louisville, Kentucky.

The Searcy County Medical Society elected the following officers at the regular meeting December 21: Dr. J. C. Pate, Big Flat, President; Dr. G. W. Dickens, Leslie, Vice-President; Dr. Sam G. Daniel, Marshall, Secretary-Treasurer; Dr. J. O. Leslie, Marshall, Delegate to State Meeting.

Dr. John R. Dibrell and Dr. Oliver C. Melson, Little Rock, announce that Dr. Herman W. Hundling, surgeon, is now associated with them.

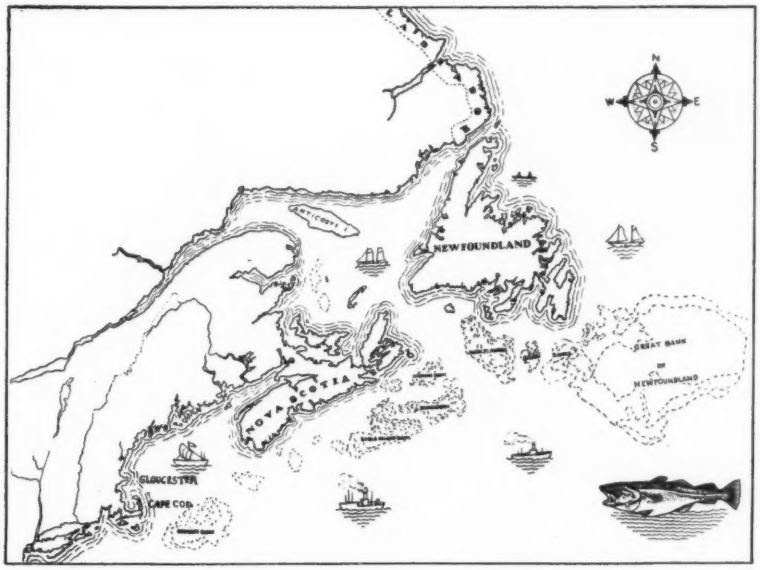
Deaths

Dr. George Davis Huddleston, Conway, aged 66, died January 28.

Dr. John S. McMurtrey, Rison, aged 75, died December 23.

Dr. James Dogan Hart, Dardanella, aged 65, died December 15.

(Continued on page 34)



The American Cod Liver Oil Map

There was a time, not so very long ago, when the fallacy existed that America could not produce good cod liver oil.

The Patch workers exploded that theory and helped to revive an old American industry. This required a combination of research work and the development of new methods for making oil.

The results have been noteworthy: An American Oil of the highest vitamin potency and—by improving the method of production—an oil of pleasant taste.

Along the shore line, from Cape Cod to Labrador, are the Patch plants—where the oil is obtained from the fresh livers. Out on the Banks are the steam trawlers equipped with the Patch cooker, where the oil is made soon after the fish come out of the water.

To increase resistance against disease and to build up energy after influenza and similar conditions—Patch's Flavored Cod Liver Oil, with its high Vitamin A content, is particularly valuable.

You should taste this fine American product, so send for a sample, and with the sample we will send you the whole story of how Patch put America on the cod liver oil map.

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El Paso is 800 miles west of the Gulf of Mexico, 800 miles east of the Pacific. It is farther west than Denver and Santa Fe, farther south than San Diego, far north of New Orleans.

Altitude 3,762 feet—just enough to be mildly stimulating, not enough to cause undue strain on the heart or difficulty of respiration.

Average annual rainfall 9.39 inches, most of it in July and August.

Average relative humidity 37%, as low as for any station where weather records are kept.

Average 331 sunshiny days a year, 82 hours of sunshine, average, of every 100 hours the sun can shine.

Mean annual temperature 63.5 degrees. Winters mild and open, temperature lower than 25 degrees extremely rare. Snow very rare. Fogs and blizzards unknown. Summers are cooled by mountain breezes and refreshing showers. On account of altitude, summer nights are delightful.

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317 Chamber of Commerce Building

Please send me your two free booklets, *"Filling the Sunshine Prescription"* and *"El Paso, in the Land of Better Living."*

Name _____

Address _____

(Continued from page 302)

Dr. Charles B. Paddock, Fayetteville, aged 66, died January 3.

DISTRICT OF COLUMBIA

Deaths

Dr. Joseph Goldberger, United States Public Health Service, Washington, died January 17 of hypernephroma.

Dr. George Marshall Mayers, Washington, aged 51, died suddenly of heart disease on December 2.

Dr. William Horace Davis, Washington, aged 57, died January 8 of heart disease.

Dr. William Pleasant Wood, Washington, aged 41, died January 10 of pneumonia.

Dr. John Stewart Harrison, Washington, aged 72, died January 7 of bronchopneumonia.

Dr. Hugh Clarence Duffey, Jr., Washington, aged 29, died December 19 of pneumonia.

Dr. George Wythe Cook, Washington, aged 82, died December 26 of cerebral arteriosclerosis.

FLORIDA

The Alachua County Medical Society recently elected the following officers for the ensuing year: Dr. J. Lee Summerlin, Gainesville, President; Dr. J. M. Willis, Williston, First Vice-President; Dr. Wilburn Lassiter, Gainesville, Second Vice-President; Dr. J. E. Maines, Jr., Gainesville, Secretary-Treasurer.

Escambia County Medical Society has chosen the following officers for this year: Dr. M. A. Lischkoff, Pensacola, President; Dr. J. M. Hoffman, Pensacola, Vice-President; Dr. J. D. Bell, Pensacola, Secretary-Treasurer.

The Pasco-Hernando-Citrus County Medical Society met December 13 and elected the following officers: Dr. T. F. Jackson, Dade City, President; Dr. Geo. A. Dame, Inverness, Vice-President; Dr. Wm. Hancock, Jr., Brooksville, Vice-President; Dr. George R. Creedmore, Brooksville, Secretary-Treasurer.

The Suwannee River Medical Association met December 21 and elected the following officers: Dr. L. J. Arnold, Lake City, President; Dr. R. E. Dicks, Dowling Park, First Vice-President; Dr. G. H. Warren, Perry, Second Vice-President; Dr. D. H. Yates, Madison, Third Vice-President; Dr. J. R. Bruce, Jasper, Fourth Vice-President; Dr. T. H. Bates, Lake City, Secretary-Treasurer.

The Seminole County Medical Society, at the December meeting, elected the following officers: Dr. C. M. Mitchell, Sanford, President; Dr. T. W. Langley, Sanford, Vice-President; Dr. J. T. Denton, Sanford, Secretary-Treasurer.

The Lake County Medical Society elected the following officers for the ensuing year: Dr. S. C. Colley, Tavares, President; Dr. W. J. Calvin, Eustis, Vice-President; Dr. W. L. Ashton, Umatilla, Secretary-Treasurer.

The DeSoto-Hardee-Highlands County Medical Society elected the following officers for this year: Dr. A. A. Pucher, Wauchula, President; Dr. H. P. Bevis, Arcadia, Vice-President; Dr. M. A. Hubert, Sebring, Secretary-Treasurer.

Hillsboro County Medical Society elected the fol-

(Continued on page 36)

WATAUGA SANITARIUM

Ridgetop, Tenn.

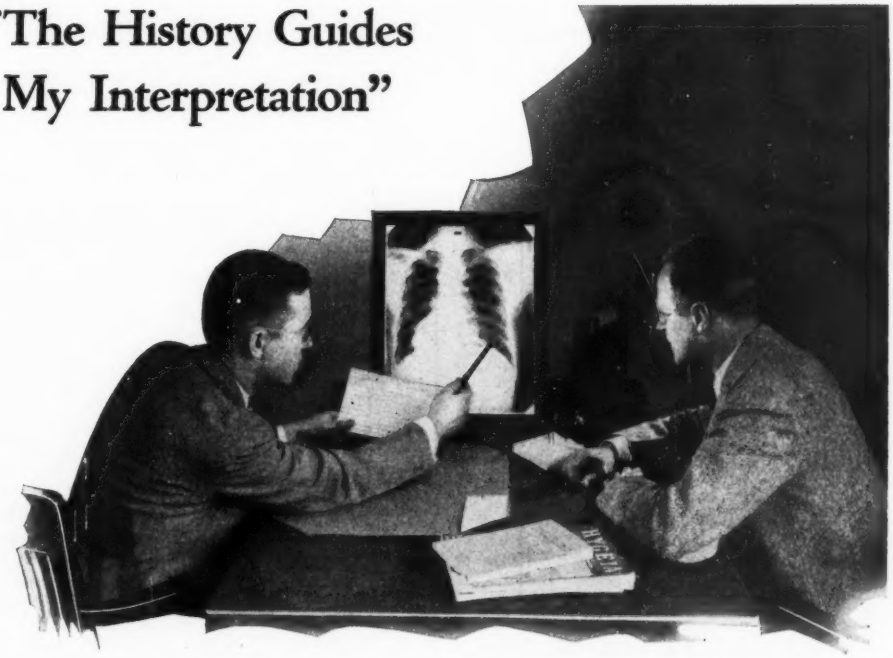
Cottage sanitarium for the treatment of tuberculosis.

Location ideal, elevation 1000 feet. Rates reasonable.

Illustrated booklet on application.

DR. W. S. RUDE, Medical Director

"The History Guides My Interpretation"



"You see, Dr. Stenton, although clinically there may be no indication of tuberculosis, yet from the history, the lungs are under suspicion. Specifically, there were no râles, the sputum was negative, and there was no hemoptysis. The recent loss of weight without confirmation is not enough to cause alarm.

"However, there is a history of pleurisy last spring and contact with a tuberculous father. With these facts I am persuaded that these shadows on the left side indicate an incipient tuberculous infiltration. Without the history, I should probably have merely suggested a re-examination in six months."

There was a time when case histories were withheld from the roentgenologist because it was felt that he would be prejudiced by what the history showed. This is a mistaken idea. Competent interpretation is not a form of crystal gazing. It consists only in *relating* observations to other findings *and* to the patient's past and present condition.

It is essential that the practising physician be alert to the advantages of the x-ray examination, that he refer patients without hesitation to a competent roentgenologist and that he cooperate with him to the end that proper consideration is given to *both* sets of findings. Neither is conclusive without the other.

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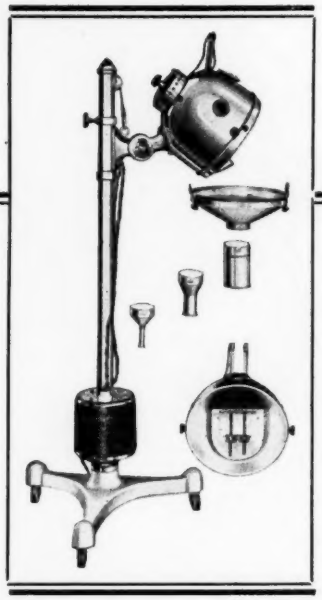

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Britesun Duo-Arc Automatic Lamp

Light therapy has earned a place of great importance in the efficient treatment of certain diseases. The problem, in many cases, is not whether or not to use light treatment; the problem is just which type to use.

The United States Bureau of Standards has gone much of the way in solving this problem through its tests of artificial illuminants, proving that the carbon arc lamp produces rays which are "the nearest approach to sunlight."

Through the use of the Britesun Duo-Arc Automatic Lamp the solar spectrum can be duplicated. Visible, infra-red and ultra-violet may be obtained in various intensities as desired. Thus any diseased condition which light therapy might help can be readily treated with this versatile lamp.

This easily operated lamp attains full efficiency immediately on turning on the current. It is durable—there is nothing to deteriorate or wear out. This permits a standardized technique with dosage prescribed within the most narrow limits.

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ULTRA VIOLET - RADIANT THERAPY - INFRA RED

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Authorized Distributors in All Leading Cities

(Continued from page 34)

lowing officers for this year: Dr. C. R. Marney, Tampa, President; Dr. A. M. Bidwell, Tampa, Vice-President; Dr. Frank T. Barker, Tampa, Secretary-Treasurer.

The following officers were elected at the December meeting of the Palm Beach County Medical Society: Dr. F. K. Herpel, Palm Beach, President; Dr. O. F. Schiffli, Palm Beach, Vice-President; Dr. R. G. Lewis, Palm Beach, Secretary; Dr. L. J. Netto, Palm Beach, Treasurer.

Columbia County Medical Society elected the following officers for 1929: Dr. Herbert Caldwell, Lake City, President; Dr. J. D. Gable, Lake City, Vice-President; Dr. T. W. Witt, Lake City, Secretary-Treasurer.

The Lee County Medical Society elected the following officers for 1929: Dr. Guy A. Longbrake, Fort Myers, President; Dr. George S. Stone, Fort Myers, Vice-President; Dr. H. Quillian Jones, Fort Myers, Secretary-Treasurer.

The Volusia County Medical Society recently elected the following officers for this year: Dr. J. B. Davis, Daytona Beach, President; Dr. R. L. Miller, Daytona Beach, Vice-President; Dr. J. Ralston Wells, Daytona Beach, Secretary-Treasurer.

The Polk County Medical Society held its regular election of officers recently and Dr. G. H. Carefoot, Fort Meade, was elected President; Dr. S. F. Smith, Lakeland, Vice-President; Dr. Herman Watson, Lakeland, Secretary-Treasurer.

Dr. E. P. Webb, Crestview, and Mrs. Julia B. Walker, Montgomery, Alabama, were recently married.

Dr. Homer Lee Pearson, Miami, was married to Miss Joeda Holland, Nashville, Georgia, on November 19.

Dr. Fouad H. Hanna, Miami, was married to Miss Margaret Alice Wetherell, Sheffield, Illinois, recently.

Dr. Maurice E. Hech, DeLand, is now associated with Dr. Samuel Aronovitz, of Miami.

Dr. J. D. Stuart, Miami, announced he is resuming the practice of medicine.

Dr. J. C. Nowling, formerly of Fort Myers, has removed to Clewiston, Georgia.

Dr. C. D. Christ, Orlando, was elected President of the Seaboard Air Line Railway Surgeons' Association at the annual meeting held in December.

Dr. T. J. Carradine, Lawtey, has been appointed Physician for Moosehaven Home, succeeding Dr. R. Y. Lane, who died recently.

Deaths

Dr. Thomas B. Mitchell, Tampa, aged 72, died October 12 of myocarditis.

Dr. Ralph Allan Rhodes, Jacksonville, aged 25, died October 25 of heart disease.

Dr. Wright Robertson, Port Orange, aged 47, died December 4 of pellagra.

Dr. Remer Young Lane, Orange Park, aged 67, died December 3 of heart disease.

GEORGIA

The Fulton County Medical Society held its twenty-fourth annual meeting on January 3 and elected the following officers: Dr. Charles E. Waits, Atlanta, President; Dr. James N. Brawner, Atlanta, Vice-President; Dr. Howard Hailey, Atlanta, Secretary-Treasurer.

Dr. Joe R. Clemmons, Macon, was re-elected Superintendent of the Macon Hospital for 1929.

Dr. J. R. Garner, Chief Surgeon for the Atlanta and West Point Railway, Atlanta, addressed the Industrial Medical Association of Quebec at the annual meeting held at Montreal, Canada, in January.

Dr. James L. Pittman, Jr., Atlanta, is now associated with Dr. W. A. Upchurch for the practice of urology.

Dr. Stephen T. Brown, Atlanta, announces the opening of offices at 205 Medical Arts Building. Practice limited to urology.

At the meeting of the Grady Hospital Staffs in January the following officers were elected: For the White Unit: Dr. Jos. H. Hines, President; Dr. Dan Y. Sage, Vice-President; Dr. M. M. Burns, Secretary. For the Colored Unit: Dr. H. C. Sauls, President; Dr.

(Continued on page 38)

KNOX SPARKLING GELATINE is the friend of the Diabetic

KNOX Sparkling Gelatine permits a number of pleasing dishes to be introduced into the diabetic's diet. It is a pure protein, whose known caloric value makes it a simple matter to calculate food formulas. The added bulk which it gives to the dish helps satisfy the patient's craving for food.

Experiments show that when gelatine is given to the diabetic, the want of body proteins often is reduced by as much as 63.7 per cent (Lusk). So Knox Gelatine becomes not only a vehicle for more concentrated foods, but has a useful protein value of its own.

In many other special diets, Knox Sparkling Gelatine is a valuable adjunct. Its protective colloidal ability, in the feeding of infants, is well known. This action helps reduce the formation of hard curds, and is beneficial in the treatment of colic, regurgitation, and other complaints arising from imperfect milk digestion. In the liquid and soft diets of convalescents and invalids, where mincing appetites must be coaxed in every way possible, Knox Sparkling Gelatine brightens the table with dozens of colorful and tempting dishes.

For 41 years we have devoted all our attention to the manufacture of Knox Sparkling Gelatine. Constant chemical and scientific control is exercised during every process—from raw material to the packaged product. It is a pure protein, unbleached, unflavored, free from sugar.

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KNOX Sparkling Gelatine is the highest quality for health. It is a protein in its purest form, particularly suitable where carbohydrates and acids must be avoided. When you purchase Knox Gelatine you not only get quality but economy, for each package makes four different desserts or salads of 6 generous servings each.

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☐ Varying the Monotony of Liquid and Soft Diets
☐ Recipes for Anemia
☐ Value of Edible Gelatine in Infant and Child Feeding

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City_____ State_____

(Continued from page 36)

C. E. Rushin, Vice-President; Dr. Keith C. Rice, Secretary.

Dr. and Mrs. Hugo Robinson, Albany, celebrated their golden wedding anniversary October 14.

Dr. Thomas H. Chestnut, Coolidge, has been elected Health Officer of Colquitt County.

The Thomas County Medical Society re-elected Dr. M. J. Erickson, President; Dr. J. M. King, Metcalf, Vice-President; Dr. C. K. Wall, Thomasville, re-elected Secretary-Treasurer.

Stewart-Webster Counties Medical Society announces the following officers for 1929: Dr. R. L. Grier, Lumpkin, President; Dr. C. E. Pickett, Richland, Vice-President; Dr. J. M. Kenyon, Richland, Secretary-Treasurer.

Pike County Medical Society has elected the following officers for the year: Dr. J. H. Grubbs, Molena, President; Dr. D. L. Head, Zebulon, Vice-President; Dr. M. M. Head, Zebulon, Secretary-Treasurer.

Dougherty County Medical Society has elected the following officers: Dr. F. K. Neil, Albany, President; Dr. J. P. Tye, Albany, Vice-President; Dr. I. M. Lucas, Albany, Secretary-Treasurer.

Grady County Medical Society elected the following officers for 1929: Dr. J. E. Harden, Whigham, President; Dr. W. R. Moore, Cairo, Vice-President; Dr. J. V. Rogers, Cairo, Secretary-Treasurer.

Jenkins County Medical Society announces the following officers for 1929: Dr. M. E. Perkins, Millen, President; Dr. H. G. Lee, Millen, Vice-President; Dr. C. Thompson, Millen, Secretary-Treasurer.

Sumter County Medical Society elected the following officers for the year: Dr. J. T. Stukes, Americus, President; Dr. J. W. Chambliss, Americus, Vice-President; Dr. Henry A. Smith, Americus, Secretary-Treasurer.

Turner County Medical Society has elected the following officers for 1929: Dr. R. D. Rawlings, Rebecca, President; Dr. F. W. Rogers, Ashburn, Vice-President; Dr. J. H. Baxter, Ashburn, Secretary-Treasurer.

Dr. Walter Gus Elliott, Cuthbert, was married to Miss Cora Belle Brewton, Atlanta, December 8.

Dr. Charles Lee Baker, Augusta, and Miss Blanche Coghill, Bowling Green, Kentucky, were married December 27.

Deaths

Dr. Micollius N. Stow, Jesup, aged 66, died December 14 of cerebral hemorrhage.

Dr. Gordon F. Martin, Menlo, aged 62, died December 19 of paralysis.

Dr. Hinton James Baker, Augusta, aged 46, died December 28 of pneumonia.

Dr. John Webb Lee, Porterdale, aged 87, died December 5.

Dr. John D. Cook, Cooksville, aged 80, died December 3.

Dr. William Warren Bussey, Augusta, aged 89, died December 16 of pneumonia.

Dr. Julius Marcellus Underwood, Lafayette, aged 70, died January 2 of pneumonia.

Dr. Andrew J. Johnson, Baxley, aged 57, died December 20 of pneumonia.

KENTUCKY

Dr. F. W. Urton, Louisville, announces the opening of his office, 648 Francis Building, and will limit his practice to eye, ear, nose and throat.

Dr. David L. Hill is now associated with Dr. R. Hayes Davis, Louisville, in the practice of internal medicine and diagnosis.

The State Board of Health, Louisville, will give health programs each Tuesday afternoon over Station WHAS.

A committee of Frankfort physicians has been appointed to assist the Chamber of Commerce in its efforts to secure for Frankfort the United States Government Hospital that is to be located in Kentucky.

The Franklin Medical Society has elected the following officers for this year: Dr. John P. Stewart, Frankfort, President; Dr. G. H. Heilman, Frankfort, Vice-President; Dr. L. T. Minish, Frankfort, Secretary-Treasurer.

Dr. O. Marvin Crenshaw, Lebanon, and Miss Mary Cordelia Bickett, Loretto, were married November 7.

(Continued on page 40)

McKESSON LOVAC

The Postoperative Drainage Pump

This is a new device to drain pus, urine or other fluids from deep-seated cavities by suction. It may be employed with any ordinary drainage tubes, wicks or catheters.

It is an outfit the profession has needed to keep dressings dry after prostatectomies; for draining and exhausting pleural cavity in empyema; for drainage of gall bladders, pelvic abscesses and peritonitis, etc.

There is nothing like it on the market for efficiency, noiseless action and controllable degree of suction.

It comes complete as illustrated ready for use.

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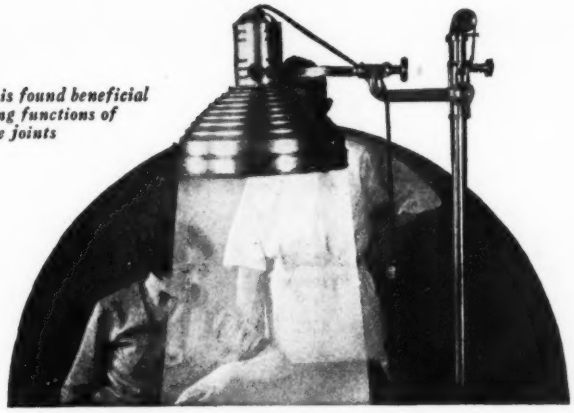
Radiant heat is found beneficial in restoring functions of the joints



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SOLLUX RADIANT HEAT LAMP

gives highly efficient service . . . has wide therapeutic scope

YOU will find that the accurate control and wide therapeutic scope possible with the Sollux Radiant Heat Lamp make it a most valuable addition to your armamentarium.

This lamp was developed after profound study and extensive experimentation by research specialists. The result is a precision lamp combining economy with efficiency. It is attractive, dignified. Its heat generator consists of four special resistance rods, consuming 1,500 watts, and giving ample intensity for all dosages.

An exclusive feature is the combination of heating element and reflector. This results in an almost flat field in regard to heat distribution at any distance from the lamp.

Because of the accurate action of the Sollux Lamp, you will invariably find that it causes your cases to respond in the anticipated manner. It can be applied whether the therapeutic indication is for general or local irradiation. Highly effective in an exceedingly wide scope of conditions, including Nephritis, Arthritis . . . Rheumatoid, Neurologic, Orthopedic and certain Dermatologic conditions . . . Organic and Functional nervous diseases.

All Hanovia therapeutic lamps are noted for the exceptional service they render. This explains why over 150,000 of the Alpine Sun, Kromayer, and Sollux Lamps have been placed in use by professional men throughout the civilized world.

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(Continued from page 38)

Deaths

Dr. Albert S. Denton, Robards, aged 61, died December 31 of pneumonia.

Dr. Frank Lee Sayre, Florence, aged 62, died November 22 of chronic nephritis.

Dr. James H. O'Reilly, Louisville, aged 76, died suddenly December 14 of heart disease.

Dr. John T. Ricketts, Mount Sterling, aged 73, died recently of heart disease.

Dr. J. Samuel Ellis, Eminence, aged 59, died December 1.

Dr. Ewing Marshall, Louisville, aged 70, died December 29 of pneumonia.

Dr. Frank C. Collins, Georgetown, aged 68, died December 24 of pneumonia.

Dr. Hugh R. Van Zant, Edmonton, aged 72, died November 13.

Dr. John Hunter Peak, Louisville, aged 63, died December 14.

Dr. Horace Terrell Rivers, Paducah, aged 59, died December 16 of myocarditis.

Dr. James Harvey Jeffries, Chevrolet, aged 53, died December 28 of heart disease.

Dr. Seth P. Parks, Irvington, aged 69, died December 29 of carcinoma of the liver.

LOUISIANA

At the recent annual meeting of the Hotel Dieu Staff, New Orleans, the following officers, comprising the Executive Committee, were selected to serve during the coming year: Dr. J. T. Nix, President; Dr. J. E. Landry, Vice-President; Dr. Lucien A. LeDoux, Secretary-Treasurer. Additional members of the Committee are Dr. H. T. Simon, Dr. D. Murphy and Dr. Paul Gelpi.

The Louisiana State Medical Society will celebrate its semi-centennial anniversary at its annual meeting in New Orleans on April 9, 10, 11.

The East and West Felicianna Bi-Parish Medical Society held its election of officers in December, with the following elected: Dr. J. W. Lee, Jackson, President; Dr. C. S. Miller, Jackson, Vice-President; Dr. E. M. Toler, Clinton, Secretary-Treasurer.

The Louisiana State Pediatric Society will hold its next meeting during the meeting of the State Medical Society at New Orleans in April.

East Baton Rouge Parish Medical Society has elected the following officers for this year: Dr. Rhett McMahon, Baton Rouge, President; Dr. C. E. Latham, Baton Rouge, Vice-President; Dr. H. W. A. Lee, Baton Rouge, Secretary-Treasurer.

DeSoto Parish Medical Society has elected the following officers for the year: Dr. R. A. Tharp, Mansfield, President; Dr. D. C. McCuller, Mansfield, Secretary-Treasurer.

Vernon Parish Medical Society has elected the following officers for 1929: Dr. J. S. Branch, Leesville, President; Dr. F. P. Jones, Leesville, Vice-President; Dr. D. O. Willis, Leesville, Secretary-Treasurer.

Dr. Amedee Granger, Professor of Radiology, Tulane University, New Orleans, gave two clinics at the convention of the Radiological Society of North America, held recently in Chicago.

St. Tammany Medical Society held their annual election of officers in December and the following were elected: Dr. L. Roland Young, Covington, President; Dr. W. L. Stevenson, Covington, Vice-President; Dr. A. F. Herrin, Secretary-Treasurer.

Tulane University, New Orleans, has accepted the offer of Dr. and Mrs. Jacob C. Geiger of a yearly gold medal to be awarded a senior or graduate student for a thesis on some public health problem of importance to the Southern States. Dr. Geiger, an alumnus of Tulane, is now Associate Professor of Epidemiology at the University of California Medical School, San Francisco.

The Shreveport Medical Society is broadcasting health talks monthly over Station KWKH, Shreveport.

(Continued on page 42)

TWO MALTBIE ACHIEVEMENTS
Send for clinical samples
Calcreose
Compound Syrup of Calcreose
A tasty, effective creosote cough syrup that does not nauseate.
Tablets Calcreose
4 grains
Full creosote medication in a form which patients will tolerate.

which meet your therapeutic requirements!

CLINICAL experience during influenza epidemics demonstrated that Calcreose was of value in the treatment of pulmonary and intestinal complications.

The Tablets Calcreose 4 grs. contain 2 grs. of pure creosote combined with hydrated calcium oxide.

Each fluid ounce of Compound Syrup of Calcreose represents Calcreose Solution 160 minims (equivalent to 10 minims of pure creosote); Alcohol, 24 minims; Chloroform, approximately 3 minims; Wild Cherry Bark, 20 grains; Peppermint, Aromatics and Syrup q. s.

The MALTBIE Chemical Company, Newark, New Jersey.

MALTBIE Calcreose

In Pneumonia
Start treatment early

In the

Optochin Base

treatment of pneumonia every hour lost in beginning treatment is to the disadvantage of the patient. Valuable time may often be saved if the physician will carry a small vial of **Optochin Base** (powder or tablets) in his bag and thus be prepared to begin treatment immediately upon diagnosis.

Literature on request

MERCK & CO. INC. Rahway, N. J.

(Continued from page 40)

Dr. Valentine H. Fuchs, New Orleans, was elected President of the Kiwanis Club for this year.

Dr. Dominique J. Gragnon, Breaux Bridge, aged 48, died suddenly November 15.

Dr. Thomas James Kay, New Orleans, aged 56, died December 9.

Dr. Abbe C. Durio, Arnaudville, aged 64, died suddenly December 25 of heart disease.

Dr. Munsell Lee Adair, Shreveport, aged 33, died November 17 of chronic nephritis.

MARYLAND

Dr. Harold L. Amoss, for the past seven years Associate Professor of Medicine at Johns Hopkins, Baltimore, will be Professor of Medicine at Duke University, Durham, North Carolina, in 1920.

Dr. Frederick B. Dart, Baltimore, has been appointed Health Officer at large with the State Department of Health, succeeding Dr. Harry Linden, resigned.

Dr. William H. Welch, Baltimore, was guest of honor at a banquet January 17, tendered on the occasion of his retirement from the Presidency of the League of Nations Society.

The Bureau of Child Hygiene of the State Health Department, in conjunction with local health officers, conducted 404 child health conferences in the State during 1928, and more than 6,600 children were given physical examinations.

G. E. Crotsley, Baltimore, has resigned as Superintendent of the Colonial Hospital.

Dr. John Frederick Hample, Baltimore, has been appointed Director of the Bureau of Communicable Diseases of the City Health Department.

Deaths

Dr. David Ridenour Newcomer, Hagerstown, aged 30, died December 22 from injuries received from a fall.

Dr. Jesse Llewellyn Massie, Smithsburg, aged 79, died December 12 of carcinoma of the liver.

Dr. Alexander W. McDonald, Baltimore, aged 63, died January 15 of pneumonia.

Dr. John George Schweinsberg, Baltimore, aged 40, died January 10 of chronic nephritis and heart disease.

Dr. Robert Sachs, Baltimore, aged 77, died January 15 of pneumonia.

Dr. James H. Frazer, Elkton, aged 86, died January 8 of pneumonia.

Dr. John Clark Manning, Baltimore, aged 56, died December 29 of bronchopneumonia.

Dr. William Baker Morrison, Hagerstown, aged 62, died December 14 of heart disease.

Dr. John E. Sansbury, Forestville, aged 59, died December 13 of carcinoma of the rectum.

MISSISSIPPI

The Newton Infirmary, Newton, was organized and formally opened on December 8. Dr. M. L. Flynt is President of the organization and Dr. Dudley Stennis and Dr. T. E. Jardis, Vice-Presidents.

Dr. Coleman C. Burns, formerly of Memphis, Tennessee, has located at Greenville.

Dr. William Ross May, Amory, has been appointed Head of the Lincoln County Health Unit.

The Tri-County Medical Society has elected the following officers for 1929: Dr. B. S. Waller, Silver Creek, President; Dr. D. T. Langston, New Hebron, Dr. H. R. Fairfax, Brookhaven, Dr. L. W. Brock, McComb, Dr. R. E. Sylerstin, Tylertown, and Dr. C. L. Simmons, Hazelhurst, Vice-Presidents; Dr. J. K. Markette, Brookhaven, Secretary-Treasurer.

At the semi-annual meeting of the Clarksdale and Six Counties Medical Society in November the following officers were elected: Dr. H. G. Johnson, Dundee, President; Dr. J. L. Nichols, Bolivar, Dr. J W. Henderson, Coahoma, Dr. J. G. Backstrom, Tallahatchie, Dr. M. B. Jernberg, Tunica, and Dr. M. V. Kirby, Quitman, Vice-Presidents; Dr. D. V. Galloway, Iuka, Secretary.

Dr. L. L. Lumsden, Director of Rural Sanitation, U. S. Public Health Service, was in Mississippi for several days in November inspecting the full-time health units.

(Continued on page 44)

IN THE TREATMENT OF

CYSTITIS and URETHRITIS

OLEO-GOMENOL

has therapeutic properties to an exceptional degree

A most powerful germicide. *An effective deodorant.* *A dependable analgetic.*

Unlike the Eucalyptols it is free of any trace of aldehydes.

For more than twenty-five years Oleo-Gomenol has been continuously and effectively used in the clinics of Europe, and in the offices of several hundred American urological specialists.

Packed in containers of 48 cc., 100 cc., 250 cc., and 1000 cc.

"GOMENOL—(Gomen, *a locality in New Caledonia,* + L. oleum, *oil.*) *An ethereal oil obtained from a plant,* Melaleuca viridiflora; *it is said to have powerful germicidal action and to be free from irritating properties when locally applied."*—STEDMAN'S MEDICAL DICTIONARY.

OLEO-GOMENOL—*Gomenol with chemically pure, alcohol-washed Olive Oil in the following percentages 5%, 10%, 20%, and 33%.*

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KLIM is a convenient and easily prepared milk for the *"Relief Bottle"*

THE practice of giving one supplementary bottle a day to breast fed infants is fast growing in favor. The "relief bottle" accustoms the infant to feeding from a bottle and lessens the difficulty of weaning later on. This supplementary bottle is popular because it releases the mother for rest, and other matters for which she otherwise would have little time.

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B. B. CULTURE and BACILLUS ACIDOPHILUS CULTURE (B. A. CULTURE) are not only effective, but are convenient in form and moderate in price.

These Cultures are available in the 4-ounce size at our selected depository stores.

B. B. CULTURE LABORATORY, INC.

Yonkers, New York.

(Continued from page 42)

Dr. Henry E. Austin, psychiatrist at the East Mississippi Insane Hospital, Meridian, has been appointed Chief Medical Officer at the Veterans' Bureau Hospital in Philadelphia.

Dr. B. D. Blackwelder has been appointed as Director of the new full-time county health unit of Natchez.

Sanitary Engineer A. W. Fuchs has been directed to proceed from Jackson to Jacksonville, Fla., and return in connection with field investigation of milk.

The Issaquena-Sharkey-Warren Counties Medical Society met on December 11 and elected the following officers: Dr. W. C. Pool, Cary, President; Dr. T. W. Huey, Grace, Dr. L. E. Martin, Anguilla, Dr. Hugh H. Johnston, Vicksburg, Vice-Presidents; Dr. L. S. Lippincott, Vicksburg, Secretary-Treasurer.

Dr. William H. Cleveland, Jackson, has been appointed Health Officer of Lamar County.

Deaths

Dr. T. W. Foster, Tchula, aged 78, died November 27.

Dr. John Sims Gibson, Crystal Springs, aged 44, died December 12.

Dr. Victor Vinnette Wallace, Carrollton, aged 50, died December 23 of pneumonia.

Dr. George Troop Bledsoe, Dubbs, aged 49, died in December of pneumonia.

Dr. Benjamin F. Travis, Philadelphia, aged 74, died December 3 of diabetic gangrene.

MISSOURI

Dr. John O'Connell, Overland, has been elected Coroner for St. Louis County.

Dr. R. B. H. Gradwohl, St. Louis, sailed for Germany December 12 to spend six weeks in the laboratory of Professor Schilling, of the University of Berlin, where he will study the new method for differential blood counting in diagnosis and prognosis.

(Continued on page 46)

To Replace Lost Alkalies

***In states of alkali depletion with their attendant symptoms, a convenient and rational method of alkalization is afforded in the prescription of* Kalak Water.**

Kalak Water contains a mixture of the elements normally present for maintaining the alkali reserve. Besides 1.0326 grams of Disodium phosphate, Sodium chloride and Potassium chloride, each liter carries a total of 6.6648 grams of the bicarbonates of Calcium, Magnesium, Sodium and Potassium.

1 liter of Kalak Water requires 710 cc. of a standard tenth-normal hydrochloric acid solution for neutralization of the bases present as bicarbonates or carbonates.

Kalak Water is the strongest alkaline water of commerce.

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Syrup Thiocol Roche
ALCOHOL 7½%
THE HOFFMANN-LaROCHE CHEMICAL WORKS NEW YORK
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Adults
2 teaspoonfuls every 2 hours, or longer doses if necessary.
Children
½ to 1 teaspoonful every 2 hours according to age.
Marketed in 6 oz. bottles
COUNCIL ACCEPTED
Never advertised to the laity
A bottle for home use sent to physicians only on request
An effective medicament for respiratory affections which contains only one drug—Thiocol. . . . No sedatives! No narcotics! Thiocol exerts an anti-catarrhal effect upon the entire respiratory tract and, in that manner, definitely aids in subduing the cough.
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The Hoffmann-La Roche Chemical Works, New York
Makers of Medicines of Rare Quality
19 CLIFF STREET
NEW YORK CITY

(Continued from page 44)

Dr. Tom Sawyer, Kansas City, has been appointed Commissioner of Pensions of the Western Missouri and Eastern Kansas District.

Dr. Harvey J. Howard and Dr. W. H. Luedde, St. Louis, have been appointed representatives of the Missouri Association for the Blind on the committee to award the Robert Johnston Essay prize, which will be given for the best essays on the prevention of blindness and on the welfare of the blind.

The Saline County Medical Society has elected the following officers for this year: Dr. F. A. Stahl, Malta Bend, President; Dr. C. W. Caldwell, Slater, First Vice-President; Dr. W. M. Bickford, Marshall, Second Vice-President; Dr. A. E. Gore, Marshall, Secretary-Treasurer.

The Wright-Douglas County Medical Society held its annual election of officers on December 6 with the following elected: Dr. L. T. Van Noy, Norwood, President; Dr. J. D. Ferguson, Ava, Vice-President; Dr. A. C. Ames, Mountain Grove, Secretary-Treasurer.

The Marion County Medical Society held its election of officers on December 8 and the following were elected: Dr. W. F. Francka, Hannibal, President; Dr. C. W. Hamlin, Palmyra, Vice-President; Dr. H. B. Goodrich, Secretary-Treasurer.

The Boone County Medical Society has elected the following officers for 1929: President, Dr. William R. Shaefer, Columbia; Vice-President, Dr. Stephen D. Smith, Columbia; Secretary-Treasurer, Dr. Hugh P. Muir, Columbia (re-elected for the third term).

Dr. Ernest W. Cavaness, Kansas City, has resigned as Health Director.

Dr. Porter E. Williams, former Superintendent of the General Hospital at Kansas City, has been appointed Health Director of Kansas City.

The St. Louis Medical Society has received a gift of $1,000 from George A. Bronson, a retired dentist of St. Louis, to be used for the employment of a full-time executive secretary.

Washington University School of Medicine, St. Louis, has been given $500,000 by Mrs. Oscar Johnson and her children for an institute of research on eye, ear, nose and throat diseases as a memorial to the late Oscar Johnson.

Deaths

Dr. Dwight M. Turner, Springfield, aged 79, died December 23 of cerebral hemorrhage.

Dr. Julius Bruehl, Kansas City, aged 75, died December 3 of chronic myocarditis and arteriosclerosis.

Dr. John W. Tribble, Bloomfield, aged 79, died December 1 of arteriosclerosis and angina pectoris.

Dr. Charles Howard, Kansas City, aged 76, died December 15 of bronchopneumonia and acute myocarditis.

Dr. John T. Kimberlin, St. Joseph, aged 70, died November 28 of angina pectoris.

Dr. William Eli Minor, Kansas City, aged 63, died December 15 of carcinoma.

Dr. Edwin LaClare Russell, Kansas City, aged 54, died December 18.

Dr. Marion Washington Wooten, Pierce City, aged 61, died October 5 of chronic myocarditis.

Dr. William C. Green, St. Louis, aged 76, died December 15 of bronchopneumonia.

Dr. John Thomas Larew, St. Louis, aged 77, died January 6 of heart disease.

Dr. Edward L. Perry, St. Louis, aged 54, died December 5 of cerebral hemorrhage and arteriosclerosis.

NORTH CAROLINA

Dr. Harold L. Amoss has accepted an appointment at Duke University in 1930 as Professor of Medicine. Dr. Amoss was born in Kentucky, received his academic training at the University of Kentucky and his M.D. and D.P.H. at Harvard. He was at the Rockefeller Institute for ten years and for the past seven years has been Associate Professor of Medicine at the Johns Hopkins. He has made many contributions to medical research upon poliomyelitis, erysipelas, and other subjects.

The Robeson County Medical Society has elected Dr. H. T. Pope, President; Dr. H. M. Baker, Lumberton, Vice-President; Dr. E. L. Bowman, McDonalds, Secretary-Treasurer.

Dr. George E. Kornegay has located at Davis.

(Continued on page 48)

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(Continued from page 46)

The Marion General Hospital, Marion, was formally opened on January 14.

Dr. J. W. Tankersley, Greensboro, and Miss Nellie Gray Ozment, Guilford College, were married November 3.

Mary P. Laxton, R.N., who has been Superintendent of the Biltmore Hospital, Biltmore, for the past sixteen years, has resigned.

Dr. Vernon Clark Lassiter and Miss Mary Dorothea Pfohl, both of Winston-Salem, were married December 22.

Dr. George W. Black has removed from Pineville to Charlotte.

Dr. Wm. Francis Martin, Charlotte, has been made a member of the Executive Committee of the American Medical Association of Vienna.

Dr. Henry F. Long, Statesville, has been appointed a member of the State Board of Charities and Welfare.

Dr. Clara E. Jones, Goldsboro, was struck by an automobile and suffered a broken leg while visiting in Philadelphia, Pa.

Deaths

Dr. Josphua Taylor, Washington, aged 58, died December 19 of a paralytic stroke.

Dr. L. A. Walker, Burlington, aged 55, died December 27.

Dr. Paul C. Brittle, Burlington, aged 49, died January 29, following an operation.

Dr. H. T. Trantham, Salisbury, aged 75, died January 23.

Dr. J. H. Anderson, Tarboro, aged 81, died January 17 of heart disease.

Dr. J. R. Person, Pikeville, aged 77, died January 21.

Dr. William Crisp, Roxboro, died suddenly January 11.

Dr. Thomas Davis Christian, Jr., Greensboro, aged 32, died January 12 of chronic valvular heart disease and influenza.

Dr. James W. McNeill, Fayetteville, aged 79, died January 7 of angina pectoris.

Dr. Levi A. Walker, Burlington, aged 55, died December 27 of acute cardiac decompensation.

Dr. Charles Erwin McLean, Oakboro, aged 46, died November 16 of acute nephritis.

Dr. James Middleton Boyette, Southport, aged 71, died November 6 of diabetes mellitus.

Dr. Clarence Moore Bynam, Marshville, aged 36, died December 17 of pneumonia.

OKLAHOMA

L. L. Loyd has been appointed Superintendent of the new Oklahoma City General Hospital, Oklahoma City.

Dr. J. E. McDonald and Miss Catherine Mitchell, both of Tulsa, were married January 2.

Dr. J. L. Day, Norman, has been elected Vice-President of the Medical Reserve Officers' Association.

Drs. J. M. Byrum and H. G. Campbell, Shawnee, have opened an emergency hospital at St. Oklahoma. Dr. William Fox is in charge.

Caddo County Medical Society has elected the following officers: Dr. E. W. Hawkins, Carnegie, President; Dr. C. R. Hume, Anadarko, Secretary-Treasurer.

Kay County Medical Society elected the following officers for 1929: Dr. J. C. Wagner, Ponca City, President; Dr. Merl Clift, Blackwell, Vice-President; Dr. A. C. Kramer, Ponca City, Secretary-Treasurer; Dr. O. H. Gowey, Newkirk, Censor.

Lincoln County Medical Society has elected the following officers for this year: Dr. J. W. Adams, Chandler, President; Dr. Levi Murray, Wellston, Vice-President; Dr. J. M. Hancock, Chandler, Secretary; Dr. U. E. Nickel, Davenport, Delegate.

Pushmataha County Medical Society has chosen the following officers for this year: Dr. D. W. Connally, Nashoba, President; Dr. J. A. Burnett, Dunbar, Secretary-Treasurer; Dr. George B. Colby, Darwin, Vice-President.

Ottawa County Medical Society elected the following officers for 1929: Dr. C. A. McClelland, President; Dr. L. W. Trout, Afton, Vice-President; Dr. A. M. Cooter, Miami, Second Vice-President; Dr. B. F. Ral-

(Continued on page 50)

Pain—

Burning

—Frequency

Are relieved, and in most cases complete disinfection of the urinary tract is established by the prompt use of

CAPROKOL

(Hexylresorcinol, S & D)

Its analgesic action on the urinary mucosa brings immediate *comfort*, and its *continuous germicidal action* in the urine produces astonishing results in urinary tract infections.

In Capsules for Adults

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Capsules Caprokol—100
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Diuretics and increased fluids should be avoided during treatment

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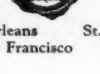
Quality First 

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Patient Types . . .

The Elderly Patient

It is often a task to keep an elderly patient in active service. Constipation may be the borderline between invalidism and good health. Cathartics are particularly harmful in such a case but Petrolagar and "Habit Time" will help the senile bowel to normal function.

Petrolagar is composed of 65% (by volume) mineral oil with the indigestible emulsifying agent, agar-agar.

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Gentlemen:—Send me copy of "HABIT TIME" (of bowel movement) and specimens of Petrolagar.

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MANHATTAN EYE SALVE COMPANY

Louisville, Kentucky

(Continued from page 48)

ston, Third Vice-President; Dr. J. W. Craig, Miami, Secretary-Treasurer.

Washington County Medical Society elected the following officers: Dr. G. V. Dorsheimer, Dewey, President; Dr. B. F. Stover, Bartlesville, Vice-President; Dr. J. W. Athey, Bartlesville, Secretary-Treasurer.

Oklahoma County Medical Society elected the following officers: Dr. John F. Kuhn, Oklahoma City, President; Dr. J. T. Martin, Oklahoma City, Vice-President; Dr. R. L. Murdoch, Oklahoma City, Secretary-Treasurer.

Pittsburg County Medical Society has elected the following officers for 1929: Dr. J. A. Munn, McAlester, President; Dr. J. A. Barton, McAlester, Vice-President; Dr. F. L. Watson, McAlester, Secretary.

Muskogee County Medical Society elected Dr. R. N. Holcombe, President; Dr. S. E. Mitchell, Muskogee, Vice-President; Dr. A. L. Stocks, Muskogee, Secretary-Treasurer.

Okmulgee County Medical Society elected Dr. L. B. Torrence, Okmulgee, President; Dr. J. A. Milroy, Okmulgee, Vice-President; Dr. M. B. Glisman, Okmulgee, Secretary.

Carter County Medical Society has elected Dr. J. C. Best, Ardmore, President; Dr. T. J. Jackson, Ardmore, Vice-President; Dr. F. A. Harrison, Ardmore, Secretary-Treasurer.

Deaths

Dr. Thomas A. Blaylock, Madill, died January 19 following an automobile accident.

Dr. James W. Rutherford, Oklahoma City, aged 80, died January 4 of influenza.

Dr. Allison H. Jackson, El Reno, aged 76, died November 29.

SOUTH CAROLINA

Florence County Medical Society met in December and elected the following officers: President, Dr. James McLeod; Vice-President, Dr. Frank Kelly, Olanta; Secretary-Treasurer, Dr. E. E. Herlong, Florence.

(Continued on page 52)

Laboratories of

Drs. Bunce, Landham and Klugh

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Jackson W. Landham, M.D., Director, Laboratory of Radiology (X-Ray and Radium)

These laboratories are equipped for making every test of clinical value in the diagnostic study of medical and surgical cases. Only standardized methods and technique are used.

In addition to the diagnostic study of cases there are adequate facilities for the x-ray and radium treatment of conditions in which these forms of treatment are indicated.

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Horlick's Malted Milk has long been used with success in the prevention and correction of constipation among breast-fed infants.

For the Nursing Mother:

Many doctors advise the nursing mother to drink regularly each day three glasses of Horlick's—the Original—Malted Milk, knowing that she will add to her own store of energy, increase the flow of her breast milk and provide her child with the food elements which result in regular bowel movements daily.

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Supplementary feedings of "Horlick's" almost invariably bring relief to the child and rest to the mother, even in stubborn cases of constipation.

Clip out this coupon and return for a supply of samples:

Name.....M. D.

Address.....

Horlick **Racine, Wisconsin**

(Continued from page 50)

At the annual meeting of the Medical Society of South Carolina on December 11 the following officers were elected: Dr. W. A. Smith, Charleston, Secretary; Dr. J. H. Cannon, Charleston, Treasurer.

The Pediatric Society held its annual meeting on January 15 and elected the following officers: Dr. E. A. Hines, Seneca, President; Dr. T. D. Dotterer, Columbia, Vice-President; Dr. R. M. Pollitzer, Greenville, re-elected Secretary-Treasurer.

Dr. James Croson, Leesville, and Miss Josephine Copeland, Ehrhardt, were married December 20.

Deaths

Dr. George Fleming McInnes, Charleston, aged 47, died January 12 as the result of injuries received in an automobile accident.

Dr. Ben Lee Allen, Saluda, aged 54, died suddenly of heart disease on November 26.

TENNESSEE

The Memphis and Shelby County Medical Society had their annual election of officers as follows: Dr. O. S. McCown, Memphis, President; Dr. P. H. Wood, Memphis, Vice-President; Dr. T. N. Coppedge, Memphis, re-elected Treasurer; and Dr. A. F. Cooper, Memphis, re-elected Secretary.

Dr. R. G. Fish, Big Sandy, has removed to Paris.

Dr. L. A. Templeton, who has been practicing in Huntland for the past twenty-five years, has moved to Winchester.

Dr. Lucius E. Burch, Nashville, has been elected President of the Southern Surgical Association for 1929.

Dr. J. B. Swafford, Assistant Physician at the Eastern State Hospital, has been appointed Superintendent of the Hamilton County Hospital, Chattanooga.

At the annual meeting held in Memphis, the Tri-State Medical Association elected the following officers for 1929: Dr. P. W. Lutterellos, Jonesboro, Ark., President; Dr. R. M. Donald, Morehead, Miss.; Dr. L. H. McDaniel, Tyronza, Ark.; Dr. E. W. Hillsman, Trezevant, Tenn., Vice-Presidents; Dr. A. F. Cooper, Memphis, re-elected Secretary-Treasurer.

Deaths

Dr. E. B. Cayce, Nashville, aged 52, died January 4.

Dr. John O. Smith, Dover, aged 74, died December 10 of pneumonia.

Dr. E. C. Blackburn, Memphis, aged 59, died December 31.

Dr. A. H. Butler, Memphis, aged 38, died December 4.

Dr. J. T. Johnson, College Grove, aged 65, died December 30.

Dr. William O. Sullivan, Newbern, aged 54, died November 30 of myocarditis.

TEXAS

Navasota is to have a new $15,000 hospital and it is expected to have the building completed by April. Dr. S. D. Coleman is erecting this hospital and has

(Continued on page 54)

THOUSANDS OF PHYSICIANS CAN'T BE WRONG

Remember the old war-time song, "Fifty Million Frenchmen Can't Be Wrong?" Neither can thousands of users of ALLISON equipment. We wish we could reproduce here the whole chorus; it would make the greatest advertisement ever written, but space does not permit. However, we do want to impress upon your mind that where good taste and judgment choose furnishings, ALLISON is invariably selected.

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TILLYER LENSES

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CENTRIFUGES

INTERNATIONAL EQUIPMENT COMPANY
352 Western Ave., Boston, Mass.

(Continued from page 52)

associated with him Dr. W. W. Greenwood and Dr. E. A. Harris.

The John Sealy Hospital, Galveston, has appointed Dr. Lucius R. Wilson, formerly Superintendent of Barnes Hospital, St. Louis, Mo., as their new Superintendent.

The new hospital at St. Angelo was formally opened November 20. This is a $140,000 institution and was made possible by 114 donations from various individuals.

The Mercy Hospital, Laredo, will erect a twenty-five room fireproof annex with every modern equipment.

The cornerstone for the new Loretta Hospital, Dalhart, was laid December 2. The estimated cost of the institution when completed and equipped will be about $80,000.

Dr. T. C. Hart, Odessa, became lost in the Davis Mountains while on a hunting party and was lost forty-eight hours before rescued by a searching party.

Nacogdoches Memorial Hospital, Nacogdoches, held its formal opening on December 11.

Deaths

Dr. Thomas Price Pipkin, Dallas, aged 66, died December 27 of bronchopneumonia.

Dr. Alexander H. Williams, Childress, aged 72, died November 10 of cerebral hemorrhage.

Dr. E. J. Neathery, Sherman, aged 61, died December 25 of angina pectoris.

Dr. Victor Guggenheim, Dallas, aged 66, died December 14.

Dr. William A. French, Athens, aged 72, died in January of pneumonia.

Dr. Robert H. Bailey, Gainesville, aged 66, died December 17 of pneumonia

Dr. Garland Benjamin Foscue, Waco, aged 68, died December 3.

VIRGINIA

The Chemical Foundation, Inc., of New York, N. Y., has made a grant to the Medical College of Virginia, Richmond, to make it possible to employ for a three-year period a full-time expert to enlarge its present program of research in chemistry as related to medicine, surgery and dentistry. The special laboratory for this work will be considerably enlarged.

The Tri-State Medical Association of the Carolinas and Virginia held its thirty-first annual meeting at Greensboro, North Carolina, February 19 and 20 under the Presidency of Dr. James K. Hall, of Richmond.

Newport News was selected for the 1929 meeting of the Seaboard Medical Association of Virginia and North Carolina. Dr. Robert A. Davis, Newport News, was elected President at the last annual meeting of this Association.

The Memorial Hospital and the Edmunds Hospital, both of Danville, have been consolidated.

Dr. Wyndham B. Blanton was elected President of the Richmond Academy of Medicine at their regular meeting held January 8.

(Continued on page 56)

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NEW ORLEANS, LA.

(Continued from page 54)

Dr. Waverly R. Payne, Newport News, has been appointed Resident Surgeon in the Department of Obstetrics and Gynecology at the Jersey City Hospital, New Jersey, for one year. He entered upon his duties January 1.

Dr. J. B. Dalton, of Richmond, has returned to his home after spending a year at the Hospital for the Ruptured and Crippled in New York, N. Y.

Dr. James K. Gray, who recently resigned as Physician-in-Charge of the Davis Clinic, in Marion, has moved to Thurmont, Maryland, where he is engaged in the general practice of medicine.

Dr. R. M. Wiley, formerly of Salem, is now located at Burkeville as Assistant Physician to the Piedmont Sanatorium.

Dr. Edward Wherry Gray, Richmond, and Miss Eva Lee Corron, Front Royal, were married December 15.

Dr. J. Lewis Clinton and Miss Katie Rose Crews, both of Martinsville, were married December 24.

Dr. Harry Walker, Courtland, and Miss Pamelia Gary, Richmond, were married December 8 in New York, N. Y.

Dr. Benjamin Herman Bailey, of Sandston, and Miss Frances Rives Adcock, of Orlando, Florida, were married December 28.

Dr. John Bolling Vaiden, Jr., Highland Springs, and Miss Lottie May Osborne, Elko, were married December 1.

Dr. William O. McCabe, Thaxton, and Mrs. Lola Weeks Serber were married December 1928.

Deaths

Dr. Archille Murat Willis, Richmond, aged 51, died January 3.

(Continued on page 58)

Correcting dangerous food fads

SUGAR & COMMON SENSE

needed in the diet

Evidences that medical and scientific men are leading a swing toward sanity in diet.

DIETARY opinion in the United States in recent years has been swept by numerous nation-wide food fads, most of them ludicrous, many of them harmful. The craze for slimness, exposed as dangerous by many physicians, is an example. The fad for eliminating sugar from the diet is another.

Diet misinformation cannot be wholly blamed on the public. A swarm of "food fakers," laymen and laywomen, with a smattering of terms gleaned from medical and scientific publications, have furnished an endless supply of articles and features to the newspapers and popular magazines and radio. These "authorities" have been read and heard by millions. Their utterances have had the attention factor of sensational interest.

It is a dangerous policy to entrust health education to lay writers. It is time for medical and scientific authorities to eliminate the dangers of faddism with precepts of intelligence and common sense.

There are evidences that medical and scientific men are leading a swing toward sanity in diet. Twelve medical specialists and dieticians recently prepared a symposium exposing the dangers to men, women and girls of starvation diets and "reduction treatments," so called, for slimness.

"The most delicate parts of the body are always the ones to suffer first," says one of the medical specialists. "Keep children and young people well nourished and up to weight," says another.

Medical directors before an eastern tuberculosis conference recently warned of the dangers of under-dieting of young girls. "The most difficult problem," said one of the directors, "facing us in combating tuberculosis among high-school girls, and particularly among the young flappers of today, is the serious habits they practice to retain or acquire a slim and graceful figure. . . . The problem of nutrition is the one we have to face in our treatment of girls of this age. It is at this age that girls are most susceptible to tuberculosis and other diseases."

A research food biologist, at one of the great universities, recently said: "Sugar is a carrier for roughage in diet—mineral salts, mineral ash, and fruit vitamins. Sugar modifies the harsh fruit acids and makes the fruits palatable. It does not injure or change in any way the delicate compounds. At least 90% of constipation is due to lack of roughage. Eat bran, fruits and vegetables, sweetened to taste."

The ranking biological chemist at another great university recently said: "Sugar is nature's incomparable flavoring agent. Sugar is one thing that relieves the deadly dullness of our overly refined foods. Also, sugar is wholesome and the most inexpensive condimental food in the world."

Sanity in diet calls for varied roughage foods. In addition to milk and milk products, young people and adults should eat a varied diet of cereals, fresh or canned vegetables and fruits. Good food promotes good health. The Sugar Institute, 129 Front Street, New York, N. Y.

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CHICAGO

(Continued from page 56)

Dr. Robert Hardaway Jones, Petersburg, aged 68, died December 19 as a result of having been knocked down by an automobile.

Dr. John Sawyer Hitchcock, Proffitt, aged 59, died December 14.

Dr. Samuel C. B. Medley, Roanoke, aged 45, died December 24 of bronchopneumonia, following influenza.

Dr. Lyndsay Wolford Newland, Splashdam, aged 41, died December 24 of pneumonia.

Dr. George Wythe Cooke, a native of Front Royal, aged 82, died in Washington, D. C., December 26.

Dr. Levi A. Walker, Richmond, aged 55, died December 28 following a brief illness.

WEST VIRGINIA

The Central Tri-State Medical Society held a most successful meeting at Huntington on January 24, the newly elected President, Dr. William R. Laird, of Montgomery, presiding.

Marshall County Medical Society has elected Dr. B. F. Bone, Moundsville, President; Dr. J. E. Arnold, Cameron, Vice-President; Dr. D. B. Ealy, Moundsville, Secretary; and Dr. O. P. Wilson, Moundsville, Treasurer.

Cabell County Medical Society has elected Dr. Oscar B. Biern, Huntington, President; Dr. W. C. Swann, Huntington, Vice-President; Dr. R. M. Sloan, Huntington, Secretary; and Dr. Ray M. Bobbitt, Huntington, Treasurer.

Barbour-Randolph-Tucker Medical Society has elected Dr. C. B. Williams, Philippi, President; Dr. C. H. Hall, Elkins, and Dr. W. E. Whiteside, Parsons, Vice-Presidents; and Dr. J. C. Irons, Horton, Secretary-Treasurer.

Deaths

Dr. Alexander B. Littlepage, Charleston, aged 74, died December 30 following an attack of influenza.

Dr. James Harvey Thornbury, Crites, aged 74, died December 12 of pneumonia.

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